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AVIATION AND COSMONAUTICS

No 10, OCTOBER 1986

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Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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REGIMENTAL COMMANDER CRUCIAL FACTOR IN FLIGHT SAFETY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 1-3

[Article by Honored Military Pilot USSR Mar Avn P. Kirsanov, chief, USSR Armed Forces Central Flight Safety Inspectorate: "The Regimental Commander and Flight Safety"]

[Text] Combat training is entering the concluding phase in Air Force subunits and units. Competing under the slogan "We shall implement the decisions of the 27th CPSU Congress, we shall reliably defend the achievements of socialism!", military aviation personnel are working hard to achieve excellent final performance results in combat and political training and to achieve effectiveness on each and every training sortie. They are preparing intensively for the end-of-year performance evaluations -- an important test of combat proficiency. Just as in the past, their preparedness for modern combat in a complex environment will be a criterion for appraising the air proficiency of military aviation personnel. And there is no doubt whatsoever that success will be achieved by those who, in addition to improving moral-fighting and psychological qualities, job-related knowledge and skills, devote constant attention to flight safety. But this will be possible only where commander concern for this important component of crew and subunit combat efficiency is displayed.

The state of flight safety in the regiment is best reflected by the level of organization of flight operations and combat training, personnel discipline, reliability of aircraft, and efficiency on the part of supporting services. It is for this reason that commanders devote so much attention to ensuring rigorous observance of established rules and regulations, preventing air mishaps and near-mishap situations.

As we know, the combat capabilities of the aviation regiment are increasing in connection with improvement in the performance characteristics of modern weaponry. The regiment is capable of carrying out diversified tactical missions and, in some air components, more complex and critical missions as well. Greater demands are being made on flight personnel proficiency. Aviation personnel training and indoctrination is organized according to the principle of learning that which is essential in war. Emphasis is placed on increasing the effectiveness of employment of weapons and equipment, bold

practical adoption of new tactics and modes of combat, higher-quality flying proficiency, and creation of the intensity and stress of combat at training exercises and drills.

An important role in providing this is assigned to the regimental commander. The success of all personnel depends in the final analysis on his ability as an organizer and on a firm attitude toward matters of flight safety, for the commanding officer must also share the blame when a pilot is unable properly to carry out a training sortie involving weapons delivery, when air traffic control personnel have trouble handling multiple aircraft, and when ground maintenance personnel have done a poor job of readying aircraft for flight operations. The commanding officer bears responsibility for everything in the regiment. And he must therefore always bear in mind that the state of affairs in the unit and the success of his men are determined first and foremost by his energy, creative endeavors, party and professional responsibility for the combat readiness of the unit entrusted to his command.

An organizer of flight training, a skilled flight operations officer, a conscientious methods expert and instructor, and an outstanding pilot are embodied in the person of the regimental commander. And it is the regimental commander who should be the first to insist on observance of the rules and regulations governing flight safety. Otherwise even the strictest requirements of regulations pertaining to preventing mishaps and the most well thought-out instructions and recommendations by superiors will fail to achieve the desired objective.

Today, with qualitative changes in aircraft and practical flight activities, the very nature of air mishap situations has changed. Air mishaps and mishap-threatening situations do not occur in the subunits and units only from one isolated cause or through the fault of a single individual. Most frequently the cause of the occurrence and development of a hazardous in-flight situation involves a combination of factors. A pilot finds himself in a critical situation as a rule due to errors of omission in organizing or preparing for a training sortie, aircraft mechanical failure, an unforeseen change in flight conditions and, finally, through his own fault. If he is unprepared to act in a difficult situation and the flight operations officer or tower controller has failed to give him the requisite assistance, only pure chance can prevent undesirable consequences. Here is a typical example of coincidence of factors of occurrence and development of a hazardous situation.

A regimental commander, supervising the arrival of a transient aircrew, failed to obtain a detailed briefing on the air situation. In addition, some of the airfield's navaid facilities were not operating properly at that time, while the aircrew itself, flying in solid IFR, failed to maintain the specified approach configuration and deviated off the prescribed approach path toward a mountain ridge. The tower controller also erred. He decided to bring the aircraft on in on its first approach and cleared it to descend to traffic pattern altitude, while virtually failing to monitor the aircraft's return on the radar. As a result the aircrew, failing to verify its position, descended below minimum safe altitude in a mountainous area....

Every person involved in the occurrence and development of this mishap-threatening situation, whether he was a member of the aircrew or one of the air traffic controllers, could have not only avoided his own personal mistakes but also prevented development of a dangerous situation as a whole if he had been better prepared and displayed greater responsibility. Unquestionably the regimental commander possessed these capabilities to the greatest degree, in addition to the authority to implement them, because the Manual of Flight Operations, this wise set of aviation regulations, clearly spells out his job duties pertaining to organization, observance and monitoring of measures pertaining to flight safety in the regiment, measures which are directed against the occurrence and adverse development of any hazardous situation during flight operations through the fault of the men under his command.

This is why the personal example of the regimental commander is of special significance in maintaining flight safety. His conscientious attitude toward observing the rules and regulations governing flight operations best promotes, fosters and encourages stepped-up efforts to achieve flight disicpline and is an effective means of preventing complacency, sluggishness, and unnecessary situation simplification in combat training.

The majority of aviation unit commanders correctly understand the need for a comprehensive solution to the problems of combat training and ensuring flight safety. In their regiment's specific base environment, taking the regiment's facilities and equipment into account, they constantly and continuously direct their men's efforts toward high-quality accomplishment of assigned tasks and toward surmounting any and all difficulties, both of a subjective and objective nature, in carrying out assignments and ensuring flight safety. Col Yu. Churilov, commanding officer of an aviation regiment, does his job in precisely this manner.

Many difficulties are presented in the course of running his unit. These include the unique -- in comparison with the standard, conventional aircraft -- aerodynamic peculiarities involved in transition processes during vertical takeoffs and landings, as well as limited experience in practical (nonacademic) instructional methods in this comparatively young aviation component, as well as the unusual basing conditions and environment. But this unit commander is firmly proceeding toward further mastery of this complex aircraft. He is constantly seeking the most efficient and effective ways to prevent hazardous situations which are typical of this aircraft, and he personally instructs the young pilots in the art of aircraft handling and combat flying. Time and again this officer has emerged the victor from the most difficult air situations. Col Yu. Churilov's selfless military labor and valor are truly appreciated. He was awarded the lofty title Hero of the Soviet Union in peacetime.

Many other regimental commanders also skillfully combine the interests of flight training with the demands of flight safety. Unfortunately, however, there are those who are guilty of serious errors of omission in ensuring flight safety. Cause for concern is the fact that flight rules and regulations are sometimes violated by commanders themselves, whose primary professional and party duty is to ensure that pilots successfully accomplish flight assignments in conformity with regulations.

Analysis indicates that there are various reasons for these, perhaps isolated infractions, but most frequently they are grounded on superficial knowledge of guideline documents and the requirements of mishap-free flying on the part of some pilots, as well as a formalistic attitude toward organizing study of regulations. This attitude can lead to undesirable consequences.

In their daily busy activities, some regimental commanders forget that they themselves have the paramount obligation to improve their combat skills and to increase their theoretical knowledge, which are a guarantee of achieving and maintaining a high degree of combat proficiency on the part of their men, as well as conduct of flight operations without air mishaps or mishap-threatening situations.

Knowledgeable commanders of initiative enjoy the respect and support of their men. Acting in an innovative and reasonable manner, they endeavor to meet combat and political training targets with a scientific approach to training and indoctrination of their men, improvement in planning, efficient utilization of training time, and rapid practical adoption of advances in and the recommendations of military theory.

One of the conditions for further increasing the combat readiness of Air Force units and subunits, and to improve flight safety, is greater demandingness on the part of senior-level officers toward personnel in authority. It is essential to seek to ensure that the officer-leaders themselves thoroughly study and strictly adhere to the requirements of all documents governing flight operations.

The regimental commander should demand of his men a purposeful attitude toward matters of flight safety, should coordinate the efforts of his men, should encourage conscientious and strictly punish negligent and remiss personnel.

The most dangerous kind of violation of rules and regulations pertaining to organizing for and carrying out flight operations on the part of aviation unit command authorities is mistakes made during planning flight operations, assigning officers to the ATC team, determining conditions of execution of specific flight assignments, as well as in the course of directing flight operations, especially when making a decision in connection with a deteriorating flight environment or the occurrence of emergency situations.

Of course in the swift dynamics of flight activities, one may frequently encounter situations which are not treated in detail in guideline documents. In these situations a commander must use his own best judgement, displaying initiative in conformity with his personal level of training and experience. For this reason one should not forget -- and this applies particularly to young command personnel -- that the best form of such condensed experience and know-how is the documents which govern flight operations. They contain in concentrated form not isolated factors but the practical experience of many years of flight operations, the successes and mistakes of preceding generations of pilots. In addition, the lack of time which occurs during decision-making in the air should by no means extend to the phases of organization, planning, scheduling, and preparing for flight operations --

everything should be done precisely and conscientiously following governing documents.

Regardless of what motivated a commanding officer — the desire to bring in aircraft at their home field in the face of deteriorating weather, in order later to avoid the complications of bringing them back from elsewhere, or the endeavor to meet the training target with a final training sortie at the end of a flight operations schedule, or the disinclination to get into an argument with the "strategists," who were insisting on using tactics at an exercise which had not been tested during combat training — he is subjecting his men to unwarranted hazard and could make null and void for quite some time many days of hard work by a great many airmen.

Complacency leads to particularly serious consequences. Some regimental commanders, giving only lip service to the campaign against air mishaps, not only fail to take vigorous practical steps following dangerous near-mishap situations and even after air mishaps, but even continue to give short shrift to flight regulations.

Such a situation developed, for example, in a certain transport aviation regiment. In spite of the high degree of reliability of the aircraft in service with the unit, totally unjustified things were happening, and in the majority of cases the pilots were to blame. Violations of preflight regimen when away from one's unit, ignoring weather, and unwarranted action from the ground and in the air had become chronic occurrences in this unit. But the officer-leaders did not properly address the matter of imposing order, claiming alleged objective difficulties. Obviously things could not go on like that. Therefore higher authorities took the strictest measures.

I should like to stress that such deficiencies are an exceptional and highly rare occurrence in the military. But they should not exist at all, for they substantially diminish the effectiveness of combat training.

Commander demandingness and firmness in appraising various shortcomings are of enormous importance. One must seriously and comprehensively analyze every mishap-threatening situation and draw the attention of all personnel, the party and Komsomol organizations to such facts. It is essential constantly to explain to flight personnel that only he who has fully mastered the skills of handling his aircraft, combat flying in extreme performance configurations applicable to the tactical environment, general plan and development of modern-day combat, he who has a serious attitude toward observing flight safety regulations can become a genuine combat pilot.

The overwhelming majority of Air Force commanders have a correct grasp of their assigned tasks and make every effort to ensure that personnel possess solid knolwedge of the demands of appropriate manuals, regulations, orders and directives pertaining to flight training. Working jointly with political workers, party and Komsomol activists, they engage in a painstaking effort at political and military indoctrination of their men and focus them on flight activities without gross errors or mishap-threatening situations.

The commanding officer's professional competence and personal example mean a great deal to young pilots and those who are receiving conversion training in a new aircraft. This motivates airmen to act with initiative, selflessly, skillfully and with caution. "Do as I do" -- this tested and proven method used by vanguard commanders in training and indoctrinating subordinates -- has become an important condition for achieving success.

The regimental commander plays a very large role in conversion-training personnel on new aircraft, in mastering new forms of conduct of combat training, and in the course of combat flying in different, nonstandard conditions. His example and ability to raise the fighting spirit of his men, as well as vigorous and consistent work on devising practical methods of ensuring flight safety determine success in this area to a decisive degree.

Thus the enormous potential of the human factor is optimally realized in flight safety under the organizing and guiding influence of the Air Force commander. It is precisely this influence which enables a well-trained pilot to respond skillfully and intelligently in any difficult situation and enables efficiently coordinated regimental personnel to work with success and without air mishaps.

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NEWLY-COMMISSIONED OFFICERS DEFICIENT IN FLYING SKILLS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 2 Sep 86) pp 6-7

[Article, published under the heading "Problems of Development of Young Officers," by flight commander Military Pilot 1st Class Capt Yu. Maksimenko: "Replacement Pilots Complete Familiarization"]

[Text] The squadron was waiting for young replacements. Naturally the subunit command authorities, and particularly the flight commander, who would be directly involved in training and indoctrinating the young lieutenants, wondered what kind of individuals they would be, what their level of proficiency and marital status was, in order to plan and schedule in advance measures aimed at breaking in the young officers and settling them in. Unfortunately we received the service records of these newly-commissioned graduates of the Kharkov Higher Military Aviation School for Pilots quite late — after the officers had reported for duty.

All the required procedures were carried out, and the official order assigning the newly-commissioned lieutenants to this unit was read. Three of them were assigned to my flight: Aleksandr Melezhik, Aleksandr Storozhko, and Timur Dzhibilov. They were likable young fellows, a bit shy, but displaying a sense of dignity and self-esteem. One was a party member, and the other two were members of Komsomol.

In a personal interview each new man related how his grades had been, what he had achieved, and what difficulties he had experienced in mastering theory and learning to fly. I endeavored to elucidate the young lieutenants' views on life and their future in the service. I shall state quite frankly that everything they told me subsequently coincided in full with their efficiency report, party and Komsomol character references based on their record at service school. I also ascertained that the young officers had only vague notions about their future. In connection with this it was necessary to explain to them in detail that they were no longer pilot cadets and that it would be necessary to get rid of certain habits, and the sooner the better, that they would have to do a good deal on their own, that they would be fully answerable for their conduct and actions, and that everything pertaining to their personal job-related training depended on each individual's purposefulness, discipline, and conscientious attitude.

As they say, however, even the most heart-to-heart talk is nothing but words. If an officer takes them to heart, that is fine. But how will things actually be in practical day-to-day activities?

The new arrivals first commenced pilot ground training. The first classes in aviation subjects revealed their respective knowledge of theory. It was evident that they would have to work hard to recall the fundamentals of theory, to acquire and reinforce the skills needed to fly under the new conditions. For example, it was necessary to determine their response to emergency situations. Lieutenant Melezhik relied primarily on intuition when responding to scenario instructions on the flight simulator -- he was clearly short of knowledge. Lieutenant Storozhko carefully thought through his actions and recalled what should be done in a given situation and how it should be done. If Lieutenant Dzhibilov did not know something, he would immediately say that he would read the material again, study it thoroughly, and then answer the question. These at first glance simple situations revealed the officers' character and personality traits, with which an instructor must be familiar.

The preliminary conclusions reached on the basis of observations during study of theory were confirmed in the air. The first dual training flights revealed deficiencies in flying proficiency which were characteristic of all three. The young pilots, for example, were not accustomed to flying cleanly. For example, deviations in maintaining prescribed heading, airspeed, altitude, bank angle, and pitch attitude reached levels inconceivable to an experienced pilot. All three showed little response to critical comments, were slow in and had difficulty with correcting errors. It also was ascertained that they lacked sufficient skills in executing a straight-in approach, a standard landing approach, and an approach with two 180 degree turns, although they were able adequately to describe these procedures. They were also weak in flying on the backup instruments when the course indicator or artificial horizon was switched off. This definitely required strong remedial action. It was necessary strongly to recommend that they thoroughly study the required performance standards in grading flying technique, so that each could analyze his own mistakes and grade his own performance. There were no grounds here for complaining of a subjective approach by the instructor.

Many points of theory had to be explained in detail literally from the ground up in order that there remain no unclear points. Frankly, however, this is not the best technique, since it fails to get a person accustomed to acquiring knowledge on his own. Essential knowledge is firmly assimilated only in the process of studying on one's own.

A solution had to be found. The test assignment method proved effective. A pilot who displayed poor knowledge in class or during preliminary preparation would be given a specific assignment, would study the appropriate literature, take notes on the material, and later would give a presentation to all the flight's pilots. Practical experience indicated that this method was quite effective. In addition, it was necessary not merely to understand but to memorize certain items. Although the response to this is sometimes less than enthusiastic, it is absolutely essential, for only in this way is it possible

solidly to commit to memory certain necessary data, particularly performance characteristics.

As we know, landing is one of the complex elements of flight. At first the young pilots made a great many mistakes in executing the landing approach and roundout. Once, for example, Lt A. Storozhko approached the runway threshold at a high angle of attack at a height of 2 meters. As a result, with a high rate of sink, he came down hard on the safety strip to the right of the runway edge.

It was ascertained at the subsequent critique and analysis session that this pilot had incorrectly distributed his attention. Particularly disconcerting was the fact that he had attempted to land while looking forward through the windshield. This is a serious error in a fighter aircraft. Interestingly enough, it proved typical of the other new arrivals as well. In addition, such approach and landing errors as flaring too high, becoming airborne again after touchdown (so-called "kozel" [skip, bounce]), and overshooting would as a rule be corrected with a go-around. They would practically ignore instructions from the tower.

Of course one would be fully in agreement with a pilot's independent actions if they were absolutely flawless. In this situation the pilot requires no assistance from the tower. But the fact is that they would make these mistakes again and again, and mistakes which would make the tower controller extremely nervous. And can one remain indifferent watching an aircraft drift upward from a high roundout, at a high angle of attack and at low airspeed, wings rocking, and with boundery layer ejection system switched on? The pilot pulls back on the stick, failing to respond to the tower controller's instructions to hold stick. Such "stunts" can cause even the most calm and composed officer, who has seen everything, to turn pale.

Quite frankly, it was necessary literally to reteach the novice pilots certain elements of the approach and landing sequence, to tell them and demonstrate methods of correcting errors, and to drum into their heads the potential consequences of thoughtless actions, inattention, indecision, carelessness, and willfulness. Many training sessions were devoted to correct distribution of attention, directing one's gaze during the landing approach, and cockpit procedures. The pilots drilled in the cockpit and on the flight simulator. Their labors were not in vain: they experienced a steady improvement in their landings.

A great deal of hard work was necessary, but that is the way things are. This is the nature of our job and our duty as command personnel. We realize that we have a direct obligation to teach a pilot to fly well, to master his weapons, to turn him into a genuine combat pilot and defender of the homeland. We all dedicate our entire knowledge and experience to this task. One might ask, however: don't the instructor pilots back at flight school see that they have not completed the job? When we discussed the matter in the squadron, we reached the conclusion that the problem is primarily caused by the fact that faulty methodology of flight instruction, and not only in landings and flying technique, was being employed in the subunit from which the newly-commissioned

officers had come. It is a much broader question, dealing with attitude toward one's job. I shall cite some examples.

On our way to the practice area, I suggested to Lieutenant Dzhibilov that he practice vertical maneuvers along mountain ridges (they are the best possible reference points for maintaining heading). This pilot would enter a maneuver correctly, but his heading would drift. In a steep dive, as he initiated dive recovery, he would simultaneously turn the aircraft toward his reference point — excellent conditions for putting the aircraft into a spin. It turns out that Dzhibilov was unaware of this.

We held classes on aerodynamics, at which a detailed analysis was made of the dynamics and configuration of forces acting on an aircraft. On performance-graded flights the pilots would work on correcting errors with the aircraft's control surfaces.

As a rule we schedule flight operations in several variations. In IFR conditions the novice pilots do not go up. As the weather improves we shift to a different schedule variation. In these instances the novice pilots are working in the classroom, and they are summoned to the airfield as appropriate. Once when we were changing schedule variations, Lieutenant Storozhko was not to be found. He had left the unit without permission. He was punished for this, but the point is not punishment, but rather that training flights are primarily for his benefit, to improve his flying skills and for him to develop as a combat pilot.

We subsequently had a long talk about responsibility and a conscientious attitude toward one's job, one's comrades, and one's family. Our talk produced results. Nevertheless the young pilots sometimes do rather foolish things. Close attention must be devoted to matters pertaining to their indoctrination and their maturing.

We also devote constant attention to observance of a proper work and rest regimen. Our climatic conditions are unusual. It is hot a good part of the year. The temperature frequently exceeds 40 degrees Celsius. It takes time for a person to become accustomed to working in these conditions. We therefore hold classes in the shade, and we watch to ensure that the men do not become overheated and that during flight operations they regularly take cooling showers. We also have the obligation to keep the young pilots healthy and highly fit.

We are especially gratified by the fact that the young officers have a correct understanding of the party's decisions, are constantly broadening their political knowledgeability and are improving their ideological tempering. They have good outline notes on the proceedings of the 27th CPSU Congress and CPSU Central Committee plenums. Measures to combat drunkenness and alcoholism were enthusiastically discussed in the subunit. Party policy and legislative enactments in this regard have won full approval. One can state with confidence that our young pilots are not ignoring our country's domestic problems or its foreign policy. They consider themselves an integral part of the great family of the Soviet people. And it is our task as commander-indoctrinators to strengthen in their consciousness — constantly, day by day

— a deep sense of responsibility for the fate of the socialist homeland and for world peace.

A year has passed since these newly-commissioned officers arrived. They have noticeably grown and matured and have gained increased confidence. But this is only a beginning. A great deal of hard work lies ahead, requiring total effort, marshaling of energies and ability. Only selfless, productive labor can produce the desired result, toward which each and every pilot with self-esteem is striving. It is the obligation of us command personnel to help our men acquire strong wings and to take their rightful place among the winged defenders of the Soviet land.

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SOCIALIST COMPETITION AS FACTOR IN BOMBER SQUADRON PERFORMANCE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 10-11

[Interview with squadron commander Gds Lt Col V. Gritsenko by AVIATSIYA I KOSMONAVTIKA correspondent Col V. Obukhov, under the heading "Visiting Competition Initiators": "Accelerating Growth"]

[Text] The decisions of the 27th CPSU Congress, the June (1986) CPSU Central Committee Plenum, and the most recent, 5th Session of the USSR Supreme Soviet, 11th Convocation, evoked an enthusiastic response by Communists and all Air Force personnel. Airmen consider it their duty to complete the training year with excellent performance results, to increase the number of high proficiency-rating specialists and excellent-rated individuals in combat and political training. They are endeavoring to make the year of the 27th CPSU Congress a year of further strengthening of discipline, increased vigilance and combat readiness, and continued high-quality mastery of new equipment and weapons.

AVIATSIYA I KOSMONAVTIKA correspondent Col V. Obukhov requested that Gds Lt Col V. Gritsenko, commanding officer of an excellent-rated squadron of a Red-Banner guards bomber regiment — which initiated socialist competition in the Air Forces — answer questions connected with improving the quality of the training and indoctrination process in the subunit.

[Question] What requirements formed the basis of training of squadron personnel in the current training year?

[Answer] First and foremost the demands of the April (1985) CPSU Central Committee Plenum and this year's 27th CPSU Congress addressed to our nation's Armed Forces. Each of us endeavored, through the results of our daily service, training and competition, to confirm that point in the Central Committee Political Report to the 27th CPSU Congress which emphasizes that the defense might of the USSR is being maintained at a level which enables us reliably to defend the peaceful labor and the peaceful lives of Soviet citizens. The training and indoctrination process, in which socialist

competition has long since become an integral component part in our squadron, is organized pursuant to this principle. It is gratifying to acknowledge that at the end of the training year personnel passed with flying colors the final proficiency test of combat and political training, and not long before this successfully took part in a tactical air exercise and earned high marks. Many factors contributed to achieving these performance goals. Socialist competition became a powerful means of achieving improved levels of military performance. In the new, revised CPSU Program competition is called a most important domain of development of worker creative endeavor and one of the principal means of self-affirmation and public acknowledgement of the individual. I know from my own experience that precisely such competition is a strong mobilizing means. It determines in large measure the quality of combat training of our airmen, important components of which include their job-related skills, ethical-political and psychological conditioning, precision formation flying ability, as well as smooth coordination on the part of aircrews and tactical control officers, flexibility and skill on the part of the ATC team, efficient and effective employment of aircraft and aircraft weapons. We endeavor to pack training activities on the ground as well as training sorties with problems in conformity with the tactics of the potential adversary and with unexpected scenario changes which are in fullest conformity with the character of modern-day combat. This develops pilots' tactical thinking and helps develop sure, confident aircrew actions in a complex, stress-filled environment. We devote considerable attention to tactical training as a most important part of personnel training. The squadron's officers are well aware that flight training is not an end in itself but only an essential means to achieve sure accomplishment of combat missions. Both current and future planning and scheduling of the training and indoctrination process are done in conformity with this. Special attention is devoted to constantly checking and monitoring the quality of training and thorough perfecting of all categories of training -- flight, tactical, weapons, technical and specialized training — which comprise the foundation of aircrew proficiency. At the end of the training year squadron personnel had to carry out critical missions in a complex simulated combat environment. The men under the command of officers Selivanov, Mikhalits, Spivak, and Sikorskiy worked particularly hard. Operating in adverse weather and with heavy jamming, they successfully passed an important test. The following is a notable feature of competition at the present stage: the more complex the environment and the more difficult the mission, the greater is the airmen's sense of responsibility for the assigned task and the keener the effort to achieve efficient and high-quality combat training. Guards Captain Kiselev's crew won and placed in socialist competition more frequently that the others. Persistence, stick-to-itiveness, initiative, a sense of the new, and refusal to rest on one's laurels are characteristic not only of this crew. Other crews also possess these qualities. The men under officers Bobrov and Petrovich ended the training year with excellent performance results. Appraising achievements with integrity and in a party-minded manner, we endeavor to draw lessons from deficiencies, which unfortunately existed in organization of our training and indoctrination process. Such an approach is logical. It is a result of aggressive restructuring in training and indoctrination of subordinates, for it was not fitting for us Communists to rest on our laurels. We hold this position when we analyze our activities, we ascertain shortcomings, and we determine ways to crrect them.

[Question] Competence, personal example, and responsibility for the assigned task on the part of leader personnel are extremely important. How does this affect the moral, ethical, and combat maturing of aviation personnel?

[Answer] The Resolution of the 27th CPSU Congress on the Central Committee Political Report emphasizes that all leader and supervisor personnel should be distinguished by ideological firmness, a high degree of political knowledgeability, competence, the ability to work as a group and to inspire others with personal example, as well as dedication to principles, firm moral convictions, and a constant need to interact with the masses and to respond to the interests and needs of others. I believe that to this we should add the ability to find and implement unutilized reserve potential in a prompt and timely manner, and the ability to appraise one's own work performance self-critically and with integrity, from the standpoint of accomplishing airmen's most important task -- to increase the combat readiness of one's subunit, one's unit, and the Air Forces as a whole. We endeavor to instill these qualities in our officers. The party and Komsomol organizations have begun more aggressively scrutinizing the training and indoctrination process, socialist competition, and matters pertaining to strengthening discipline. This has made it possible to intensify the human factor and greatly to increase the indoctrinational role of the collective. The following incident comes to mind. The flight under the command of Guards Captain Belov had a consistently fine record. Belov himself was a knowledgeable officer with initiative. The other officers, warrant officers, and NCOs also did a fine job. At a certain party meeting, however, sharp criticism was leveled against him for deficiencies in organizing competition. The criticism was justified. Belov drew the correct conclusions, and everybody worked together to correctthe deficiencies. Competition became more lively in training classes, at drill sessions and at tactical air exercises, and current competition standings began to be determined and announced on a regular basis. Outstanding individuals were cited, and mistakes made by lagging personnel in training and aircraft servicing were pointed out. Aircraft commanders, analyzing flight recorder tapes and other performance-monitoring devices, synthesized advanced know-how and endeavored to make sure that it was communicated to every airman. In recent years our navigators have collected data on the nature and character of mistakes and errors made in bombing at the range. On the basis of an analysis of collected statistical data, we made adjustments on each aircraft. Bombing accuracy improved significantly, and this had a positive effect on improving quality and effectiveness of the training process and, in the final analysis, on the squadron's combat readiness. What lessons are we drawing in totaling up the year's socialist competition results? The main criterion is degree of combat readiness, the level of the men's ideological conditioning, discipline, organization, and aircrew esprit de corps. We focus attention on positive results and on shortcomings, and on new and progressive developments in handling the main items connected with organizing combat training and work duties. Completeness and quality of meeting socialist pledges are rated in our squadron precisely from this standpoint -- moral and combat maturing of personnel.

[Question] What can you tell us about efforts by squadron personnel to achieve flight efficiency, effectiveness and safety?

[Answer] This is an important practical question. By seeking improved quality and effectiveness of combat training, our aircraft commanders and flight commanders work persistently to improve their men's job skills on the basis of thorough knowledge of the aircraft, aerodynamics and tactics, teach them skillfully to utilize the increased combat capabilities of today's modern aircraft, and are constantly seeking new and more effective tactics and modes of combat flying. This is grounded on systematic, thorough analysis of flight discipline in the subunit, further improvement of indoctrination work, and support for all new and progressive innovations. For example, in response to a suggestion by party members, approved by the squadron authorities, errors and mistakes in aircraft servicing and operation are entered in a special log. Analysis of deficiencies and shortcomings helps more fully determine their causes and trends and helps promptly predict and prevent mistakes. A high degree of aggressive spirit by the men is continuously maintained in this squadron, and aggressive, purposeful efforts are conducted to make cohesive aircrews with a strong esprit de corps. Our party members clearly see this as an important reserve potential for improving the men's air, weapons, and tactical proficiency and a guarantee of ensuring mishap-free flying.

[Question] Could you tell us about this in greater detail?

[Answer] Modern aircraft and new aircraft servicing and maintenance techniques have increased the importance of the requirements specified in manuals and regulations, rigorous maintenance of flight discipline and observance of regulations. Conscientious follow-through and flawless discipline are exceptionally important in aviation. Even the slightest bit of carelessness or mistake by any individual can lead to serious consequences during the performance of flight assignments. Constantly assisting the command authorities, this squadron's Communists seek to ensure that discipline becomes an inner need on the part of each and every airman. Success in mastering complex aircraft and mishap-free operation are inconceivable without this. The flight operations experience of our vanguard aircrews convinces one that with skilled, precise organization of flight operations, one eliminates the possibility of near-mishap situations and air mishaps. As a rule such subunits boast a high degree of teaching and methods skills on the part of commander-instructors, and training facilities are maintained in an exemplary state and are efficiently utilized. Personnel, unswervingly observing the requirements of documents governing flight operations, work persistently to improve their knowledge of their aircraft, aerodynamics, and tactics. An atmosphere of demandingness on the results of flying activities, which has been created and is being maintained in most of our squadron's aircrews and maintenance groups, helps prevent errors of omission, miscalculations and all types of accidental and random occurrences. Experience confirms that the degree of efficiency of any training sortie depends to a decisive degree on an airman's personal moral-political and job-related qualities, demandingness on himself, self-discipline, and sense of duty and responsibility for the assigned task. We consider it our direct party and professional duty to instill these qualities. In our squadron we are guided by the following rule in our daily performance of duties and flight activities: in aviation there are no trivial matters — everything is important. I shall cite the following example. Once Guards Lieutenant Abalmasov informed the squadron engineer

while he was preflighting an aircraft that during an engine inspection he had noticed a smear of something which looked like powdered graphite. The two maintenance specialists made a careful examination and discovered failure of a teflon sleeve. The defective unit was immediately replaced. The system operated normally on the next flight. In the course of preliminary preparation, the flight commanders consider the specific features of the forthcoming flight operations, thoroughly analyze near-mishap situations, take measures to prevent them, and strictly observe proper sequence in returning to the air personnel who have gone some time without flying. We must admit, however, that at times even we are guilty of annoying errors of omission in training pilots, navigators, and other specialist personnel. Sometimes we fail to make a thorough analysis of near-mishap situations and do not fully determine their causes. Some measures, directed toward preventing mistakes in flight operations, are carried out without a well-conceived system and fail to produce the desired results. We are waging a resolute campaign against all these deficiencies.

[Question] What contribution are party members making to the campaign for flight safety?

[Answer] In combat training our party members endeavor to concentrate their attention on the principal tasks on which aviation personnel are working in a given period. They take active part in party-political work, which is conducted in a purposeful and aggressive manner. Important aspects of this work include strengthening flight discipline and ensuring personal exemplariness by CPSU members in maintaining a high degree of combat readiness and in ensuring flight safety. It has become a firm rule in the party organization to discuss all matters collectively at party meetings and to implement adopted resolutions without fail. The secretary or one of the members of the party buro always talks to pilots upon their return from a training sortie. They inquire about how he is feeling, how the aircraft performed, and the specific features of the training flight. This is done not only to study and synthesize experience but also in order to take effective measures in a prompt and timely manner to prevent mishap-threatening situations. During preparations for flight operations party activists seek to ensure that their work is in conformity with the specific features of the forthcoming assignments, encompasses all personnel with its influence, and focuses them on strict observance of documents governing mishap-free flight operations. In short, regardless of the matter at hand, party members set the pace. They are marching in the vanguard of competition; other aviation personnel measure performance against them and set them up as an example.

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Mi-24 GUNSHIP CREW KILLED IN AFGHANISTAN

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 12-15

[Article, published under the heading "They Were Decorated by the Homeland," by Col Ye. Besschetnov: 'Our Marks Will Remain...']

> [Text] Party member Military Pilot 1st Class Lt Col N. Kovalev commanded a rotary-wing squadron during his tour of duty with the limited Soviet forces in Afghanistan. During his months in-country he flew more than 200 combat sorties. One of them turned out to be his last. By ukase of the Presidium of the USSR Supreme Soviet, Nikolay Ivanovich Kovalev was awarded the title Hero of the Soviet Union (posthumously) for courage and heroism displayed while rendering internationalist assistance to our friends the people of the DRA in defense of revolutionary achievements. The following article tells of the life and career of this intrepid officer and of his faithfulness to his military duty.

Lieutenant Colonel Kovalev climbed into the cockpit of his Mi-24 helicopter. Squadron navigation officer Maj Ivan Potapov took the weapons operator's position. Flight technician WO Vladimir Yegorov had already taken his place in the cabin. The crews of three more helicopters were also preparing for departure. While differing in character and personality, level of knowledge and skill, these airmen were united in their desire to carry out the mission with honor. The Afghan authorities had requested the assistance of Soviet airmen to help promptly spot and, if possible, to halt the advance of a dushman [Afghan rebel] caravan carrying arms and ammunition.

The aircrews flew over the mountain terrain at an altitude ensuring safety from possible rebel fire, closely scrutinizing the ground below. After they had reached the designated area, Nikolay Ivanovich Kovalev was the first to spot a string of slowly-plodding, heavily-laden camels and horses. "I wonder if this is the caravan our Afghan comrades had in mind," the thought flashed through his mind.

He left the second two-ship element to provide cover, while he and his wingman, Captain Tibilov, proceeded to descend, continuing their vigilant

scrutiny of the caravan. They saw muzzle flashes below. The caravan security element, realizing that they had been spotted, had hastily opened fire on the approaching helicopters.

The situation was clear. Kovalev turned his helicopter onto a target heading and responded to the bandit fire with a rocket salvo, followed one second later by another. Tibilov attacked simultaneously. The dushman hastily took refuge behind rock outcrops, but they continued firing. Executing a turn at a safe distance, under covering fire by the second two-ship element, Kovalev and his wingman flew another pass. The two other gunships soon followed suit.

After the dushman resistance had been crushed, the helicopters cautiously put down near the battle site. The airmen approached the shot-up caravan, their assault rifles at the ready. It had been heavily laden with arms and ammunition!

"This could have killed hundreds of innocent people," the squadron commander commented in his monotone voice. The element soon returned to base with its trophies of war. Some time later they handed over the arms and ammunition to the provincial state security authorities.

This incident from N. Kovalev's combat career was reflected in a service record document, with the contents of which I subsequently became acquainted. It noted the squadron commander's tactical proficiency, personal courage and bravery displayed in a difficult and dangerous situation, and his ability to execute combat missions intelligently and with precision. It was emphasized that on his combat sorties Lieutenant Colonel Kovalev always acted with boldness and composure, with determination, and always taught his men to do likewise.

Nikolay Ivanovich was born in the city of Nevel in Pskov Oblast, to a worker family, four years after the war. He spent his childhood and youth here at 22 Oktyabrskaya Street, where his mother and his older sister and her family still live. His father, Ivan Yakovlevich, a tank crewman, fought the Japanese militarists on the Khalkhin-Gol and subsequently saw a good deal of combat in the Great Patriotic War. He was wounded several times. He died in 1981. The pilot's mother, Alimpiada Ivanovna, is still working. Recalling her son, she related: "Nikolay was a strong, healthy boy. He was never sick. And he could take care of himself. He was obedient and responsive."

Anatoliy Kuznetsov, a school friend of Nikolay Ivanovich and today a doctor at a district hospital, recalls: "He and I were the same age, were in the same class at school, and both of us played in the band. Nikolay liked playing the clarinet and the baritone horn. He liked athletics. In the apartment-building yard there were parallel bars, a horizontal bar, and we had barbells. I believe he first thought about a flying career when we were in grade 8. Our band had taken first place in a review-competition and won a trip to Velikiye Luki. There we saw close up for the first time an An-24 aircraft, a big aircraft at the time. I noticed a spark in Nikolay's eye when he saw this airplane."

After completing 10-year secondary school in 1966, Nikolay Kovalev enrolled in the Syzran Military Aviation School for Pilots. It was still a secondary-level school at the time. He studied hard. How happy he was when four years later he earned his officer's shoulderboards! His dream had come true. He was a military pilot. Filled with hopes and dreams, in October 1970 Nikolay left for his first duty assignment in the Red-Banner Far East Military District.

He had heard a great deal about the Helicopter Regiment imeni V. I. Lenin, but he had never imagined that he would ever serve in this outfit, with its fine revolutionary and combat traditions.

He was made a right-seater on an Mi-6 helicopter. He soon proved to be a capable, developing military pilot, with a fine future. Four months later he was promoted to section navigation officer. This young officer also did a fine job in his new position, fully justifying the trust which had been placed in him.

After a year and a half as a section navigation officer, he became commander of an Mi-24. He had to undergo conversion training to the new equipment. Persistent, serious, filled with a sense of personal responsiblity for performance achievements, he devoted his full energies to mastering the complex new helicopter. At the same time he worked on developing a smooth performance by his crew, and he borrowed combat flying tips from others.

His career seemed to be going well: he had earned 3rd Class, received a rank promotion, and had gotten married. The future seemed rosy indeed. But an unforeseen circumstance almost threw a monkey wrench into his career. During a routine flight physical, the doctors detected a health problem. Kovalev was grounded.... His warrior character was truly displayed with this setback. Nikolay Ivanovich's desire to fly proved to be so powerful that he was able to strengthen his health, overcome his ailment, and be restored to flight duty in a year and a half's time.

The year 1976 was a memorable one in Captain Kovalev's career. He was accepted to CPSU membership, in April he passed the tests for 2nd Class, and that fall he was assigned to a tour of duty with the Group of Soviet Forces in Germany. He was commander of an Mi-24 helicopter for about a year, then was promoted to section commander, and a year later, soon after earning 1st class, he was placed in command of a squadron.

Nikolay Ivanovich was in charge of a large collective, and he bore personal responsibility for the men's training and indoctrination. And the squadron commander set about his task with a great deal of zeal and energy! He relied extensively on his deputies, on the section commanders, and on the party and Komsomol activists. In his very first year the squadron was the regimental competition winner and earned the title of excellent. The squadron commander deserved a good deal of the credit for this.

Major Kovalev also soon earned a great deal of respect and authority at a new duty assignment in the Red-Banner Baltic Military District, to which he was

transferred in 1981. He won people over with his honest, conscientious attitude toward his job, with his selflessness and responsiveness.

Sharing his impressions of that period in Nikolay Ivanovich's life, Lt Col K. Borovikov, a former colleague, recalled: "Kovalev was an extremely well-prepared commanding officer. He also possessed the amazing ability to remain calm, cool and composed in any situation. In the air he had the ability quickly to assess the situation and to make the only correct decision. He knew well the rules and regulations of flight operations, and he intelligently applied them. All this helped him skillfully train flight personnel."

Kovalev received his next promotion, to lieutenant colonel, in July 1983. Soon he was named to replace the regimental deputy commander, who was temporarily unable to perform his duties. Holding this position for a year, he accomplished a great deal in the area of personnel selection and placement, improvement of the training process, and preparing training facilities. At the same time he logged a great many highly-intensive flying hours.

"At that time," recounted Konstantin Tarasovich Borovikov, "I happened to fly together with Kovalev. We flew varied training sorties. Seeing how boldly and resolutely he performed in the air, one always marvelled at his outstanding flying skill. At times it seemed that Kovalev and his aircraft were one. He had such a fine sense of its behavior and flew it with such precision."

In the summer of 1984 Lt Col N. Kovalev was placed in command of a squadron which was rendering internationalist assistance to our friends the people of Afghanistan. He shared his first impressions in a letter home: "I arrived at my new duty assignment on 11 August. Three days later I was flying on a combat mission. I fly every day.... This is quite an interesting area. We are surrounded by mountains up to 2,000 meters in elevation, and one is sometimes amazed at the silence. It is a little dusty and a little hot. Right now the temperature is not going above 40 degrees Celsius.

"It's not a very big spread — several trucks, about 10 dogs and 3 sheep. There is a bathhouse with a pool. The food is decent. Things aren't too bad. Nothing really exciting to report."

Kovalev's deputy for political affairs, Maj Aleksandr Chuvayev, who had proven to be an excellent pilot and a competent political worker, capable of doing a good job (he was subsequently awarded the Order of Lenin), accompanied Kovalev to the DRA. Major Vladimir Yefimov, an intrepid combat pilot and skilled mentor to his subordinates, was squadron deputy commander. His military labor has been honored by the Order of the Red Banner. They became the commanding officer's closest support in running the outfit. Chuvayev and Yefimov liked Nikolay Ivanovich's stick-to-itiveness, his calmness and measured deliberation in all things, and his ability to put things in the squadron in order without fuss or bustle. They handled urgent matters in a smooth and coordinated manner.

The outfit had its traditions. A corner in the enlisted men's barracks had been set up to honor Hero of the Soviet Union Maj Vyacheslav Gaynutdinov,

awarded this lofty title for rendering internationlist assistance to the DRA. The men also solicitously honor the memory of many other airmen who have distinguished themselves in the skies over Afghanistan. Nikolay Ivanovich, together with his deputy commander for political affairs, party and Komsomol activists, sought to maintain in the men a strong, aggressive attitude, a feeling of dedication to military and internationalist duty, and to mobilize the airmen's efforts to continue and further build upon the subunit's outstanding traditions. And naturally he displayed in combat sorties a personal example of courage, valor, composure, and always accomplished his flight assignments in an exemplary fashion.

Sr Lt Vitaliy Etmanov, who was serving in the squadron at that time, told me about a remarkable incident. The peace and quiet was disrupted In Baghlar Province that fall. Bands which had made their way into the area were terrorizing the local population and were mounting armed raids here and there. At the request of the Afghan authorities, Kovalev's squadron was providing support to DRA ground forces subunits in crushing the dushman.

The airmen were assigned the mission of helping wipe out a band which was entrenched in a fortified area at the entrance to the Panjsher Gorge. Nikolay Ivanovich selected the most highly-trained crews. It was a sunny day, and they had good ground observation from their flight altitude. Dwellings stretched along the valley floor. Dushman lay entrenched somewhere down there. He made contact with a forward air controller, was vectored to the target area, and soon spotted dushman muzzle flashes. The squadron commander, contemptuous of danger, went in swinging. He and his wingman fired rockets at the structures from which the bandits were delivering intensive fire. Then an attack run was flown by the two-ship element led by Capt Igor Bezrodnyy. They flew a second attack pass, placing intensive fire on the bandits.... The strike was massive and devastating. Afghan infantry, launching an assault, stepped up the pressure and soon were in possession of the fortified area.

Hero of the Soviet Union Military Pilot 1st Class Lt Col V. Ochirov also talked to me about Nikolay Ivanovich. Late that fall 6 helicopters landed at their base. The group was led by Kovalev. The airmen remained for about a week. Every day they flew combat sorties. Things got particularly hectic when dushman attacked a Soviet convoy carrying nonmilitary goods on the road between Kabul and Ghazni. Kovalev's six-aircraft element engaged the bandits, and subsequently provided the convoy with air cover, risking taking hostile fire at any moment. On the following days Kovalev and his men flew escort and air cover for other Soviet and Afghan convoys delivering food and fuel to the civilian population. They were repeatedly exposed to danger, and on all sorties Lieutenant Colonel Kovalev displayed an example of staunchness, courage, and valor, was the first to take fire, and was the first to attack, smashing bands of counterrevolutionaries. The others sought to emulate him. His fellow crewmen — Maj I. Potapov and WO V. Yegorov — performed with equal valor. They possessed warrior qualities to spare.

A difficult situation presented itself on 1 June. An Afghan subunit became surrounded. Soviet motorized riflemen hurried to the rescue, but the rebel band continued to tighten the noose, resupplying from a supply cache in the

mountains. Lietenant Colonel Kovalev was assigned the mission of destroying this supply cache.

They quickly took off and headed toward the target area. Squadron deputy commander Maj Vladimir Yefimov flew as Kovalev's wingman. A second two-ship element was led by flight commander Maj Aleksandr Permaykov, a genuine expert at his job. The supply cache was carefully camouflaged and concealed, but Permyakov's element nevertheless spotted it fairly quickly and radioed its exact location to the flight leader.

With his wingman providing cover, Lieutenant Colonel Kovalev swooped toward the target and poured devastating fire into the supply cache. Yefimov followed suit. But by this time dushman weapon crews had concentrated fire on the squadron commander's helicopter, which was swinging away after completing its run on the target.

Nikolay Ivanovich felt his ship shake, riddled by machinegun bursts. His controls were not responding. The squadron commander reported the situation to his wingman and proceeded to try to save his crew and aircraft. He maintained communications with the ground for an entire minute, and for an entire minute he attempted to regain control of the helicopter, trying to gain altitude. But he was unable to glide to a safe distance from the target. A rocky mountainside loomed up ahead. He could not turn away. The lives of patriot and internationalist Lt Col N. Kovalev and the members of his crew came to an end here, on the side of a nameless mountain in Afghanistan.

Provided overhead cover by the other two-ship element, Major Yefimov landed nearby. They retrieved the bodies of the crewmen. The news of the deaths of the squadron commander and his crew stunned the men in the squadron, striking pain in the heart of every officer, warrant officer, primary-rank enlisted man, and NCO. They could not believe that Kovalev and his comrades in arms were dead.

...Nowadays hardly a day goes by when Alimpiada Ivanovna does not have visitors. She has been visited by people from the Komsomol Combat Glory Museum imeni Aleksandr Matrosov in Velikiye Luki. She is visited by reporters from the local and oblast newspapers. She is frequently visited by pathfinders from Secondary School No 2, from which Nikolay Ivanovich had graduated. On the anniversary of his death former colleagues and comrades in arms came to Nevel. They paid tribute to his bright memory, placed a marble headstone, and put flowers on his grave....

Popular rule in Afghanistan is growing stronger. Intrepid Soviet pilot party member Lt Col N. Kovalev has made a contribution toward strengthening the revolutionary achievements of the people of this country.

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EXCESSIVE DELAY BETWEEN TARGET RECONNAISSANCE AND STRIKE

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[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Doctor of Military Sciences and Professor Col A. Krasnov: "The Cost of Lost Minutes"]

[Text] The crews boarded their aircraft. Waiting for the command to take off, they watched impatiently as the hands of the cockpit clock counted off the precious minutes slipping by. The fact is that the cost of a single minute on that clock dial was quite high: the ground troops were urgently in need of intelligence gathered by air reconnaissance, information which would determine in large measure the success of the forthcoming offensive operation. But the airmen were being held on the ground.

The situation was not the best. Weather deteriorated just prior to departure time. This naturally required refining the modes of accomplishing the mission assigned to the aircrews. Lt Col N. Privalov hastily leafed through manuals, studied the weather report, consulted with the weather forecasters, but was unable to reach a definite decision. By the time he finally made his decision, the aerial reconnaissance data were no longer needed. This was the cost of an officer's sluggishness, which was a consequence of inadequate job preparedness and an inability to foresee the development of events.

There is a reason for starting a discussion on rapidly reaching a correct decision with this incident. Under present-day conditions the problem of sufficient time contains two aspects: a technical aspect, connected with extensive automation of intelligence-gathering processes, and an operational-tactical aspect, which prescribes further improvement in the work methods of commanders and staff officers and a higher level of professional competence on the part of these personnel.

We shall endeavor to analyze in detail the reason for the reconnaissance aircraft departure delay. On the one hand one can understand officer Privalov: he was endeavoring seriously and thoroughly to consider important finer points affecting mission accomplishment. On the other hand he ignored the time factor. Why was this? All indications suggest that the primary factor here was an inability to assess the situation quickly, which in turn

led to an acute shortage of time for accomplishing reconnaissance. In addition, deficiencies in this officer's tactical proficiency were aggravated by the absence of a mission variation prepared in advance for the possibility of change in weather, which would have made it possible to cut to a minimum the time required for making a decision and briefing aircrews.

Today's combat is swift and dynamic. The situation frequently changes exceptionally swiftly. A commander receives a continuous stream of diversified, frequently contradictory information, which he must assess, understand, and then make a correct decision. Experience convinces us that in order to be prepared for weather "surprises," unexpected moves by the "adversary," and to be able to make a well-substantiated, prompt and timely decision, an officer must have at hand different plan variations prepared in advance and must have the ability to choose the most optimal variation. Herein lies a considerable reserve potential for saving time.

This tenet is not new per se, but requirements on it have greatly increased today. One feels today a more acute need for more thorough preparation of plan variations, the content of which is grounded to a greater extent on operational-tactical calculations and simulation. Commanders and staff officers today have at their disposal various electronic and automatic devices enabling them to speed up calculations. All this is well and good, but we do not yet have devices which would totally replace a commander's analytical labor in the process of decision-making. Therefore, in order to avoid fatal sluggishness, one must learn to reduce time expenditures by combining the capabilities of machine and man.

This is persuasively attested by the experience of the men of the squadron commanded by Military Pilot 1st Class Maj S. Radionov. In this subunit all the most important elements, such as reconnaissance targets, capabilities of intelligence-collecting equipment, "hostile" air defense efforts, and weather conditions are rigorously classified and compiled into a uniform catalogue or, as it is also called, "data bank." They are defined in the form of standard aerial reconnaissance variations. It is important to note that the variations are regularly updated taking into account change in environment, situation and missions, and new reconnaissance techniques are born. An innovative approach to things greatly facilitates analysis of situations developing in the course of combat training and makes it possible more quickly to analyze and understand what is taking place.

In spite of the fact that in the squadron they have achieved appreciable success in accomplishing the tasks assigned personnel, the innovative search for untuilized reserve potential continues. The entire process of preparation for reconnaissance sorties is permeated by the effort to gain time. The airmen endeavor to plan and schedule reconnaissance more efficiently, to maintain aircraft and equipment in proper working order, as well as to keep aircrews mission-ready at all times.

Where and how can seconds and minutes be wrested from performance standards, which are already quite tough? This question constantly occupies the center of attention of squadron command authorities and party organization. Various answers to this question are found. For example, reconnaissance aircrews are

taught not only to be quick about becoming departure-ready and taking off, but also to reach the targets as quickly as possible and to obtain exhaustive intelligence on them. On each flight pilots practice various tactical devices, a high rate of employment of which makes it possible to get the jump on the "adversary" and to deceive him.

Aircrews' efforts to reduce mission execution time also include shortening the time required to pass on obtained intelligence. Every pilot knows exactly what objects and installations of interest should be reported by radio immediately, what intelligence should be transmitted via special radio links, and what information can wait until returning to base. In addition, aircrews endeavor to compress information selected for transmission into extremely brief, concise and at the same time exhaustive radio messages, aware that any questions and requests for detail from the ground lead to loss of precious minutes.

This is not easy to accomplish. Aerial reconnaissance crewmen should possess an entire aggregate of skills the importance of which is obvious. But are they always correctly developed? I once attended a briefing session in a subunit which was preparing to conduct aerial reconnaissance. The squadron commander, pointing out that it was necessary to use time wisely, instructed his pilots to perform intelligence-gathering equipment operating procedures as rapidly as possible. At first glance this would seem to be correct. In actual fact, however, these instructions proved to be ill-conceived. Some pilots made mistakes in their haste and thus made working conditions more difficult for themselves.

We must also mention the following important factor in a discussion on shortening the time required to carry out mock combat missions: a shortage of time leads to increased emotional stress, which worsens perception of the environment and situation and increases the probability of incorrect procedures, even failure to perform certain equipment operating procedures. And yet even the simplest analysis shows that there is adequate time available to operate the equipment on the mission; it is merely a matter of utilizing this time correctly.

In Maj S. Radionov's squadron they have found a different approach to solving this problem, which can be called a combined approach. Reconnaissance aircrews engage in the search for "extra" minutes and seconds not in a random and spontaneous manner but purposefully. In this subunit they have drawn up lists of scenario instructions which help in developing fast, sure, and competent actions during preparation for and execution of reconnaissance flights. The persons in charge of training drills and exercises prepare in advance a scenario of actions (both for their men and for the "adversary") and create a complex tactical environment. This makes it possible to increase the effectiveness of training activities and to develop emotional stability.

At first glance everything in the squadron seemed the same as before: only attitude toward the time factor had changed, and the men had developed the habit of valuing time. Results are clearly in evidence. The squadron commander puts efforts to gain time in the form of competition. Pilots compete for time in accomplishing reconnaissance missions, while engineer and

technician personnel compete for the fastest sortie-readying of aircraft. Every specialist uses the reserve potential at his disposal -- both intellectual and physical. Here we have the human factor in action!

There are many factors which affect in one way or another prompt and timely accomplishment of reconnaissance missions. They also include a pilot's ability to choose the main thing, to avoid scattering his energies and attention.

...A reconnaissance mission request was received at the command post directed by officer D. Makarov. The requirement was to determine the location of "hostile" missile launchers in a suspect area. Quickly assessing the situation, the commander radioed: "949, two-ship element, go, you will receive mission instructions when airborne."

After takeoff the element leader, military pilot Capt M. Nikolenko, was instructed to fly a variation 3 mission in a specified grid square.

The pilots headed for the designated area at the specified airspeed. As they were approaching it, the element leader spotted a pair of "enemy" bombers. Under other circumstances Nikolenko would have attacked without giving any other thought to the matter, but at that moment to enagge in air-to-air combat would mean failure to accomplish the primary mission. Therefore, hugging the ground, he proceeded to maneuver, endeavoring to remain unnoticed, carefully scrutinizing an area containing a heavy concentration of troops and equipment.

The pilot's attention was drawn by a cluster of support vehicles hugging the forest edge. There must be a launch position in the vicinity. Soon he got a clear view of launchers with missiles on them. Nikolenko immediately went on the radio and transmitted the targets' position coordinates. Within minutes a strike was delivered on the detected target.

The reconnaissance pilots' success was not merely a matter of luck. They had thoroughly studied the revealing signs of objects of intelligence interest, the dynamics of combined-arms combat, and they had just rehearsed several reconnaissance mission procedures variations, and for this reason had been so quick to interpret a complex ground environment. This also enabled them quickly to obtain precise intelligence, which made possible a prompt strike on the target.

A no less important component in the effort to gain time is prompt utilization of obtained intelligence. The following incident illustrates the consequence of delay.

Fighter-bombers were to hit an "enemy" airfield. The officer in charge of the operation sent out a pair of reconnaissance aircraft, which precisely determined the number and location of aircraft on the airfield. On the basis of the obtained intelligence, the decision was made to hit the field. The commander specified targets and distributed them among the subunits, and organized a thorough taget briefing. An hour and a half after the reconnaissance a force of fighter-bombers, executing an undetected maneuver, appeared over the "enemy" airfield. But there were no aircraft on the ground.

It was later ascertained that the commander of the defending force, spotting the two reconnaissance aircraft over his field, quickly redeployed his subunits to an alternate field. Thus the considerable time between acquisition and utilization of the acquired intelligence simply made that intelligence valueless. One can conclude from this that air reconnaissance and target strike carried out in the traditional sequence "reconnaissance sortie - return to field - planning of strike - strike" are no longer adequate in present-day conditions. They offer too little chance to find mobile targets where they were spotted.

Efforts to reduce the time required to make subunits combat-ready, as well as accurate and timely execution of assigned missions demand painstaking, well thought-out work on a daily basis. One is convinced of this by the experience of vanguard outfits, know-how which should be put to use rather than ignored, as is sometimes the case. The cost of lost minutes can be quite high in the conditions of modern-day combat. The time factor must be duly appreciated.

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PLEA TO STANDARDIZE AIRCRAFT TECHNICAL TERMINOLOGY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 20-21

[Article, published under the heading "The Reader States His Opinion," by Honored Test Pilot USSR Col S. Leshkovich: "Standardizing Terminology"]

[Text] One way to improve the reliability and operational efficiency of modern aircraft is to improve means of information display (SOI). Thanks to the efforts of our scientists and designers, clarity of visual representation and quality of gauges and displays, heads-up display of performance and navigation information, and information synthesizing systems are being improved. Standing in particularly glaring contrast to this is the lack of attention toward such an important area of SOI as linguistic or terminological organization of aircraft equipment and procedures, which gives rise to terminological variations which sometimes fail to reflect any semantic distinction.

Let us compare, for example, placards in the cockpits and on emergency warning panels of modern aircraft of two different types:

"Podkachki net" [No Boost] — "Raskhodnyy bak" [On-Line Tank].
"Pozharnyy kran" [Fuel Emergency Shutoff Valve] — "Perekryvnoy kran" [Shutoff Valve].
"Sledi davleniye v busternoy sisteme" [Check Pressure in Booster System] — "Gidro na upravleniye" [Control Hydraulics].
"Masla malo" [Oil Low] — "Struzhka v masle" [Shavings in Oil].

The list goes on and on. I believe, however, that this is a sufficient sample.

Terminological variations are also frequent in acronyms. Extensive use of this linguistic device constitutes unique synthesis of a growing flow of information and an attempt to make a word more "meaning-filled."

Every airman is acquainted with the acronym SAU — so-called aircraft automatic control systems. Concise and expressive. Why not standardize the names of other systems, such as air-intake control systems (UVD, SrVMU, ARV, EESUV, etc) with a single acronym with a distinctive number indicating

aircraft type, or the family of pitch and heading indicators, which is also widely represented in the technical manuals (KV, ANIS, GIS, IS, IK, VK, IK-VK, etc).

In spoken language there are many local dialects characteristic of a specific geographic area, as well as languages of specific trades or professions -- jargons. Existing side by side with them is a standard literary language, the fundamental vocabulary of which is carefully protected against contamination by dialecticisms and against excessive penetration by foreign words. In this regard technical literature is unfortunately more accessible to so-called proprietary words and expressions.

Let us look for examples in the operating manual of one of our modern fighters. The KV (attitude indicator) with which everybody is familiar is called here IK-VK (pitch and heading information system). One might ask whether there is such a thing as a "noninformation" system? All pitch and heading indicators have the basic function of informing the pilot and related aircraft systems on the aircraft's heading, roll and pitch attitude.

The SORTs or TsSO indicator light is called KSTs -- dangerous flight configuration warning light (centralized). Or take, for example, the acronym OEPrNK (optoelectronic bombsight and navigation system). Can this really be considered a felicitous acronym? Its author should be aware of the fact that any phrase, in addition to brevity and expressiveness, should meet requirements of rhythm and pleasing sound, that is, it should sound good. In the Russian language we would hardly encounter the combination OE at the beginning of a word.

I should like to remind everybody involved in developing aircraft operating and technical manuals how demanding toward terminology was N. Ye. Zhukovskiy, the father of Russian aviation. Here are some examples of terms first introduced by him: ugol ataki [angle of attack], koren lopasti [blade root], razmakh kryla [wingspan], ometayemaya vintom ploshchad [propeller-swept area]. How graphic and palpable!

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CHELYABINSK AIR FORCE NAVIGATOR SCHOOL

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 24-25

[Article, published under the heading "Military Educational Institution Affairs," by Col S. Sharmanov: "On Precise Heading"; Photographic report from the Red-Banner Chelyabinsk Higher Military Aviation School for Navigators imeni 50th Anniversary of All-Union Komsomol]

[Text] The cadets climbed aboard, and the silvery bomber took off. The future navigators were handling navigator duties on a cross-country flight for the first time, under instructor supervision. They were confident. Intensive training in the classroom, on the simulators, and at the athletic facility were a guarantee of success.

After years of study, the young men would receive their lieutenant's commission. A new detachment of ideologically convinced, politically mature, and professionally-competent Air Force officers would join the winged fraternity of aviators. They would perform difficult weapons delivery and tactical missions in varying air and weather environments, day and night, in clouds and in the stratosphere, displaying skill, resourcefulness, composure, as well as psychological and physical toughness.

In the meantime, striving to achieve the stated goal, these cadets would study military affairs properly, following the behests of V. I. Lenin.

These future air warriors are proud of the history of their school, which has rich combat traditions. The Chelyabinsk Higher Military Aviation School for Navigators imeni 50th Anniversary of All-Union Komsomol traces its distinguished genealogy back to the 15th Military School For Pilot-Observers, founded in 1936. Its graduates fought the Japanese samurai and the fascist invaders. In the years of the Great Patriotic War alone the school trained 5,100 navigators and 2,400 aerial gunner-radio operators. Its graduates displayed mass heroism, courage and valor. Aircraft navigator Lt A. Burdenyuk was a crewman of N. Gastello, who flew his burning aircraft into an enemy tank column. Similar exploits were performed by school graduates Lts V. Samosudov, G. Tereshchuk, and V. Polikarpov. 26 graduates have been awarded the coveted title Hero of the Soviet Union.

The postwar generation of military air navigators who have graduated from this school, one out of every three of whom is a party member, has carried on the traditions of the combat veterans in a worthy manner. Dozens of cadets have graduated with a gold medal, and hundreds have graduated with honors. 45 graduates of this school, including Gens A. Ketsmets, A. Medovikov, N. Safonkin, L. Chervyakov, and F. Yalovoy, have become Honored Military Navigators USSR. Officers N. Voronkov, V. Dverkin, V. Konishchev, V. Kusmartsev, V. Tsupko, and others displayed skill, resourcefulness, and excellent moral qualities. They successfully carried out combat training missions in extreme conditions.

In honor of the 50th anniversary of the Great Patriotic War, the school was awarded a Commemorative Banner of the CPSU Central Committee, Presidium of the USSR Supreme Soviet and USSR Council of Ministers for excellent results in combat and political training, and in 1972, in commemoration of the 50th anniversary of the USSR, it was awarded a Commemorative Badge and Certificate of the CPSU Central Committee, Presidium of the USSR Supreme Soviet, and USSR Council of Ministers.

Modern combat equipment places tough demands on training Air Force specialist personnel. Today an Air Force navigator must possess engineering knowledge to a greater degree than in the past. The school is constantly improving the training and indoctrination process, developing and expanding facilities, and improving the qualifications of faculty personnel. The entire system of cadet training and indoctrination is being restructured in conformity with the new requirements on higher educational institutions. The navigator-instructors have assumed a principal role in training and preparing for flight operations. Officers V. Lobanov, decorated for courage displayed while rendering internationalist assistance to the Afghan people, V. Bykov, O. Rusyayev, and other military instructors devise the most advanced methods, aggressively adopt technical teaching devices, and effectively utilize training simulators and visual aids. By the second year their students are carrying out complex flight assignments.

A good deal of attention is devoted to training navigator-engineers in the training aviation regiment -- initiator of socialist competition in the Red-Banner Ural Military District air forces.

Competitiveness helps in mastering complex combat equipment. There is competition among the flying groups for the honor of bearing the name of school graduate Hero of the Soviet Union Capt A. Toporkov. In recent years cadets A. Bazarov, A. Zhutikov, Ye. Kotov, A. Orlov, V. Shvets, and others have earned the title of top bombardier.

The future navigators are training to become not only high proficiency-rating specialists but also officer-indoctrinators. Cols V. Ayrapetov and O. Grishechko, Lt Cols M. Vinitskovskiy and I. Kharchenko, Maj V. Gorynin and other instructors get them involved in scientific research activities. The cadets write research papers, hold political instruction classes for and present lectures and reports to compulsory-service personnel.

Amateur performing talent activities are highly developed at the school, contributing to the cadets' aesthetic education. For more than 25 years now a people's theater has been putting on plays on military-patriotic themes, under the continuous guidance of V. Voronin, an actor with the Chelyabinsk Drama Theater.

The future air warriors are strongly influenced by correspondence with veterans of the Great Patriotic War. Recently the cadets received a letter from 1943 graduate Hero of the Soviet Union Maj Gen Avn V. Lakatosh. The boys were moved by his parting message: "Today you are in school, but tomorrow you will become officers — defenders of the peaceful labor of Soviet citizens. The homeland is entrusting a formidable weapon to you and is teaching you the occupational specialty of navigator-engineer. Master your profession and strengthen discipline. Strengthen our military, increase its combat readiness. We, your senior comrades, combat veterans, pass on to you this relay baton and have confidence that you will continue to increase the fame of our Armed Forces and the fame of our Chelyabinsk Aviation School."

...During the state final examinations the top cadets are given the honor of making a flight in the place of famed navigator Lt A. Burdenyuk. And they always receive a mark of excellent for this flight. The young aviators are prepared to defend the socialist homeland.

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TOWER CONTROLLER INTERVENTION IN EXECUTION OF APPROACH AND LANDING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 26-27

[Article, published under the heading "Flying and Psychology," by Military Instructor Pilot 1st Class and Candidate of Technical Sciences Lt Col N. Litvinchuk, and Candidate of Medical Sciences Maj Med Serv V. Kozlov: "Instructions From the Tower"]

[Text] Pilot cadet Yu. Sviridov was doing solo pattern work. The flight operations officer, closely watching the aircraft's behavior on final approach, was ready to assist at any moment. Everything was going well. But as he approached the ground, the young pilot flared high. The tower controller immediately ordered: "44, hold stick! Hold stick!" The aircraft floated parallel with the runway for another instant, and then began to drop hard. The tower immediately ordered: "Stick back, stick back!" The aircraft stopped settling and again began to rise. And once again the tower controller ordered: "Hold stick!" Finally, after landing hard, the aircraft rolled out safely.

The pilot cadet's poor landing performance was adjudged to be a result of lack of pilot proficiency.

There are plenty of examples of this kind. And yet statistics indicate that pilots make mistakes on landing not only due to their own fault. Tower controllers must share the blame.

In an article entitled "Reliability of Control and Flight Safety" (AVIATSIYA I KOSMONAVTIKA, No 6, 1985) the author notes that competent, reliable air traffic control is a most important practical component in ensuring flight operations safety. A most important direction to take in preventing mishaps is elimination of incompetent actions by an air traffic controller which can lead to an emergency situation. Starting our discussion with the above example, we shall examine the substance of certain mistakes in air traffic control, and we shall attempt to determine ways to prevent them.

First let us ask: why is it that in some instances a pilot carries out the air traffic controller's commands and in other cases does not respond to them? To answer this question, we shall perform a psychological analysis of landing

procedures. It has been demonstrated that a pilot constructs the process of flying the aircraft on the basis of a spatial orientation contained in his memory. It is precisely this spatial orientation which contains information on the present atitude of the aircraft, required flight parameters, and air situation. As he flies the aircraft, the pilot compares this spatial orientation with an information model of the given flight configuration. Detecting a difference in the actual value of flight parameters from the desired parameters, he makes a decision and introduces corrections with the aid of the aircraft controls.

In other words, each pilot control action is grounded on his notion of the actual and desired condition of the aircraft and flight parameters. In addition, before executing a given control motion, the pilot predicts the end result. This provides regulation of his aircraft-controlling actions.

During execution of a landing, a pilot uses for the most part noninstrument signals, by which he estimates height, its derivatives, and other parameters of the aircraft's position and motion relative to the runway. Quality of perception depends on a number of factors, chiefly skill in visual estimation.

A pilot can make mistakes on his approach and landing due to a discrepancy between actual and desired control motions, an erroneous decision, as well as due to perception incorrectness. If a control error occurs but the pilot notices it and knows how to correct it, he does not need help. But when an error has occurred due to incorrect perception, such as an incorrect estimate of height above the ground, the roundout will not be completed at the desired height. In this instance the pilot is unaware of his error, and he needs help from the tower.

When a tower controller notes a high flare, he orders the pilot to hold stick. This command does not fit in the logic of the pilot's notion of his flight configuration, and he continues flying the aircraft without responding to it. Then a more persistent order comes over the radio, which forces the pilot to submit, although he is unaware of the magnitude of error, since the tower controller said nothing about it. As a result the pilot ceases to rely on the spatial orientation existing in his consciousness and switches over entirely to flying the aircraft on the basis of commands from the tower.

The accompanying figure [no figure in source document] contains a pilot information diagram when maintaining height on landing in response to commands from the tower. It is apparent that in switching from independent pilot control to flying the aircraft on the basis of commands from the tower, incoming information is perceived only via the the auditory tract, and its structure changes substantially. This information is not only limited in array of signals in comparison with visual information but also arrives with considerable delay. First the tower controller perceives it. On the basis of this information he makes a decision, and then radios instructions to the pilot. The flight parameters may change considerably in the time from the moment of information input to receiving and execution of a command.

Returning to the above, we can note that the student pilot cannot be blamed for shifting to flying on the basis of commands from the tower. However, even

a person who possesses a rich imagination is unable to construct a correct picture of his position solely on the basis of the order "Hold stick!" For this reason delay in correcting errors is inevitable, and control movements also change.

As a rule they are abrupt and excessive, since the pilot is unable to act in conformity with the nature of the change in flight parameters and predict this change on the basis of orders from the tower. On the one hand he is not told what mistake he has made or the magnitude of this mistake, while on the other hand his level of professional expertise is poor. It is precisely for this reason that, on receiving the tower controller's command, the pilot carries it out without appropriate adjustment of control movements. As a result the next command, "Stick back!", is not carried out in conformity with the change in flight configuration, for the same reasons. And once again another command is radioed.

As we noted, student pilots sometimes fail to respond to tower controller commands, and this is easily explained. The fact is that when he hears the command "Hold stick!", the pilot cannot immediately compare it with his present spatial orientation which, as already stated, he considers to be correct. Therefore he is unable immediately to switch over to flying in response to prompts from the ground. As a result execution of a command is delayed until the pilot recognizes the advisability of doing so or perceives it as an order, or else he will not carry it out at all.

What should be the content and form of a command so that a pilot will execute it without difficulty? Proceeding from the fact that the aircraft is being flown on the basis of a spatial orientation, an order to the pilot to alter the flight configuration should contain an adjustment or correction to the spatial orientation. Figuratively speaking, the outside agency should control not the pilot's hands but his head. This means that he should first be given information on the qualitative and quantitative aspect of his deviation (error), on the basis of which he will make a change in his notion of the flight configuration and will commence to fly the aircraft based on a new, more accurate spatial orientation. In these conditions a command to correct an error issued following information on the error will only speed up the process of adjusting the flight configuration.

Consequently, if correct spatial orientation is lacking, correct actions will not ensue. It is totally incorrect to control a pilot's actions solely by volitional effort, compelling him to manipulate the controls. A command to correct an error (deviation) should first contain information and subsequently prompt action: for example, "You have flared one and a half meters high, hold stick, let it settle!" Receiving such an order, the pilot immediately appraises his actual position, makes adjustments in his spatial orientation, and then corrects his mistake.

In some instances in order to restore correct spatial orientation it is necessary first to control the pilot's attention and subsequently to issue a command to correct the error. As we know, for example, one frequent cause of errors on landing is incorrect direction of one's gaze. In this instance it

is desirable to give the command: "44, you have flared one and a half meters high, look left, hold stick, let it settle!"

In an extreme situation, when the pilot fails to respond to advice from the tower, naturally instructions should be given in the form of a direct order.

We should note that some tower controllers are convinced that a short command requires less time to transmit and, consequently, to correct an error. Practical flight operations experience and analysis of a large number of incorrect pilot actions during landing procedures attest to the opposite. We currently have established standard commands which a flight operations officer (assistant flight operations officer) is to give to a pilot or student pilot in response to various errors in the landing approach, final landing procedures sequence and during landing proper. They have been developed on the basis of experience in air traffic control, but they do have shortcomings, as discussed above, and require substantiated adjustment. For example, when an aircraft balloons or becomes airborne again after touchdown, it is recommended that the tower controller give the following commands: "44, hold stick!," "Stick back!" In actual practice the pilot is given at best only the first correct command, which he does not always grasp correctly, and this is followed by a series of execution commands, which in many instances are a principal cause of a mishap-threatening situation.

We should note that the subject under discussion is correction of deviations in flight configuration or pilot errors. The fact is that the sequence and structure of commands given to a pilot in response to an in-flight emergency situation, and particularly requiring immediate ejection, are somewhat different. In these cases each second counts. The main thing is to compel the pilot to carry out rigorously-defined actions as quickly as possible, especially if he is unable to come to this decision on his own. Therefore in these instances instructions are given as a command — with precision and brevity of expression. For example: "801, eject!" First the callsign is given. However, if the pilot has no inkling that he is in an emergency situation, even if time is of the essence it is essential briefly to inform him of this fact. For example: "44, your aircraft is on fire, eject!"

At this point we must also address the obverse side of the matter of operational stability of the "pilot-aircraft" system. The person flying the aircraft should have precise knowledge of the meaning and significance of instructions given by air traffic controllers. For example, a tower instruction "Hold stick!" means either that the pilot has flared high or has already established the correct pitch attitude for touchdown. In both instances it is essential to ensure that the aircraft settles and touches down softly.

Experience indicates that mutual understanding and precision coordination between flight personnel and ATC controller greatly enhance flight safety in all situations, even the most difficult.

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NIGHT LANDING APPROACH AT WEATHER MINIMUMS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) p 28

[Article, published under the heading "For a High Degree of Combat Readiness," by Military Pilot 1st Class Gds Maj V. Shramko: "At Night, at Weather Minimums"]

[Text] As we know, the landing is one of the most difficult components of flight training. Executing a landing approach at night at weather minimums is particularly difficult. There have been many instances where mistakes have been made at this phase of a flight, and sometimes mishap-threatening situations. Most frequently the "cleanness" of a landing depends on the quality and thoroughness of preflight preparations. If the pilot is properly briefed on cloud conditions, visibility, configuration of runway approach and threshold lights, runway markings, configuration of lights around the airfield, and mentally prepares himself to overcome possible adverse situations which may arise during approach and landing, on the whole one can consider him ready to fly.

Practical experience indicates that when flying in actual IFR conditions a pilot flies by instruments until he approaches the outer compass locator, after which he gradually begins to shift to ground reference points and, after finally emerging from the clouds, transitions to visual flight. Even brief attempts to establish visual contact with the ground when flying in clouds are considered a serious error in IFR procedures.

Experience indicates that after passing the outer compass locator the so-called combined procedure is most acceptable, when a pilot gradually, as visual reference points appear, incorporates them into his cross-checking scheme. By this we mean sequential scan of the instruments and exterior reference points, with primary emphasis on monitoring the instruments, with gradual transition to visual flight. The more visual reference points appear in the pilot's field of vision, the greater the frequency with which he checks his aircraft's position visually, while continuing to fly by instruments.

Naturally it is impossible from a practical standpoint to give any one cross-check scheme which is acceptable for all situations, since a pilot's procedures depend in large measure on the type of aircraft, its

instrumentation, and his level of proficiency. Nevertheless there is one general rule: scan primarily the control and performance instruments, which determine an aircraft's spatial attitude and flight configuration.

As one transitions over to visual flight, certain instruments can be eliminated from the scan or be scanned less frequently. For example, if the direction of the landing approach is clearly evident on the basis of ground reference points, the readings of instruments displaying heading and course are for all practical purposes no longer needed. This enables the pilot to pay greater attention to the altimeter, airspeed indicator, and vertical velocity indicator.

The landing approach becomes much more difficult in conditions of indeterminate cloud cover with varying cloud bases or in conditions of ground fog. In such conditions ground reference points are visible, if poorly, when commencing the landing approach. For example, the pilot can see the approach lighting system, the so-called "traveling wave" [flashing strobe approach lights], or even, in part, the runway lighting. As one descends, however, they may suddenly disappear. If the pilot is not flying by instruments he may lose his frame of reference, which is very hazardous. For this reason instrument flight is continued until visual references are clearly distinguishable.

Frequently additional difficulties arise during a landing approach at weather minimums, connected with crosswind and buffeting. When crabbing or slipping to maintain runway alignment, especially in buffeting conditions, it is important closely to monitor airspeed and heading, problems with which are almost inevitable in such instances. When making slip adjustments it is essential to avoid high slip angles and to bring wings level just prior to touchdown, to avoid landing on one wheel.

In the fall the weather is subject to abrupt changes. Drizzle and rain mixed with snow make landing and rollout more difficult. So-called aquaplaning occurs, for example, when landing on a wet runway. This effect is caused by the fact that as they roll along the runway, the wheels "drive" a layer of water out ahead, and braking proves ineffective. The proper procedure is to release the drag chute and then to apply the brakes cautiously, avoiding the occurrence of sliding or skidding.

Nowadays pilots are frequently called upon to fly in IFR and marginal VFR conditions. This places a particular responsibility on instructors, who must keep a close eye on the training progress of flight personnel, explain the specific features of landing under specific conditions, spot and correct errors in a prompt and timely manner, and work to achieve clean flying technique. Only if this is accomplished can one hope successfully to increase the flying proficiency and combat readiness of aircrews and subunits.

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HELICOPTER GUNSHIPS FLY CLOSE AIR SUPPORT IN FTX

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) p 31

[Article, published under the heading "We Shall Implement the Decisions of the 27th CPSU Congress and Reliably Defend the Achievements of Socialism!", by Maj V. Bondarenko: "Supporting Motorized Riflemen"]

[Text] "It's time!" the motorized rifle subunit commander turned to forward air controller Maj A. Mikhalishchev. "Call your people in. It's about time to launch the attack...."

Major Mikhalishchev had operated with ground troops formations on numerous occasions, and he had a good grasp of the developing tactical situation. The motorized riflemen needed air support right now, suppression of weapons in "enemy" strongpoints.

Within seconds Lt Col V. Tishchenko, flight operations officer at the helicopter gunship field staging site, had received the request and was briefing aircrews.

The helicopter crews delivered a solid strike. A two-ship element, in low-level flight, headed swiftly toward the range, to come to the aid of the motorized riflemen in a prompt and timely manner. The aircrews displayed daring, alertness, precision, and the ability to fly undetected. Although the "adversary" was expecting the appearance of "hostile" helicopters and his antiaircraft assets were in a state of readiness and focused toward the points of suspected gunship appearance, the helicopters appeared where they were not expected to appear.

Of course low-level flight made navigation much more difficult, but copilot-navigators Sr Lts S. Lukov and R. Zamaletdinov correctly determined course and heading. Operating in a difficult tactical environment, they confirmed the fact of their high degree of proficiency. Specialists 1st Class Sr Lts V. Plokhoy and A. Gershman closely monitored the helicopters' systems.

The main participants in the "engagement" — helicopter pilots Military Pilots 1st Class Capts V. Ponomarev and V. Golosov — have logged more than 2,000 hours. Ponomarev is a section commander and skilled methods expert. His crew

bears the title of excellent. Flight agitator officer Golosov is of equal proficiency.

The helicopters simultaneously executed a turn to the right above thinly-forested terrain. Small stands of birch and spruce streaked past beneath them. They passed a lake, a sure landmark. Capt V. Golosov closely followed every jink and maneuver by his leader, endeavoring to follow precisely. The pilots of this element understand each other precisely and function as a single integral whole.

It was time! The helicopters instantly shot skyward. Below them were the squad lines of the assaulting troops. At this point it was important quickly to spot weapon positions. The "enemy" was well concealed and camouflaged and was remaining inactive for the moment, but Major Mikhalishchev radioed precise terrain-feature reference points. A second passed, another — and the rockets streaked groundward. The helicopters swung low and headed home.

Back on the ground, the aircrews immediately analyzed their performance, while ground crews inspected, refueled, and rearmed their aircraft.

In the meantime they were informed that the attacking battalion had advanced several kilometers. But the "adversary," concentrating self-propelled artillery in the path of the attacking troops, had thrown APCs into a counterattack, with the self-propelled artillery providing covering fire.

Once again a signal flare shot skyward in response to a request by the motorized riflemen, and once again the helicopter crews sped off to their aid.

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PROGRAMMING AN ELECTRONIC CALCULATOR

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 32-34

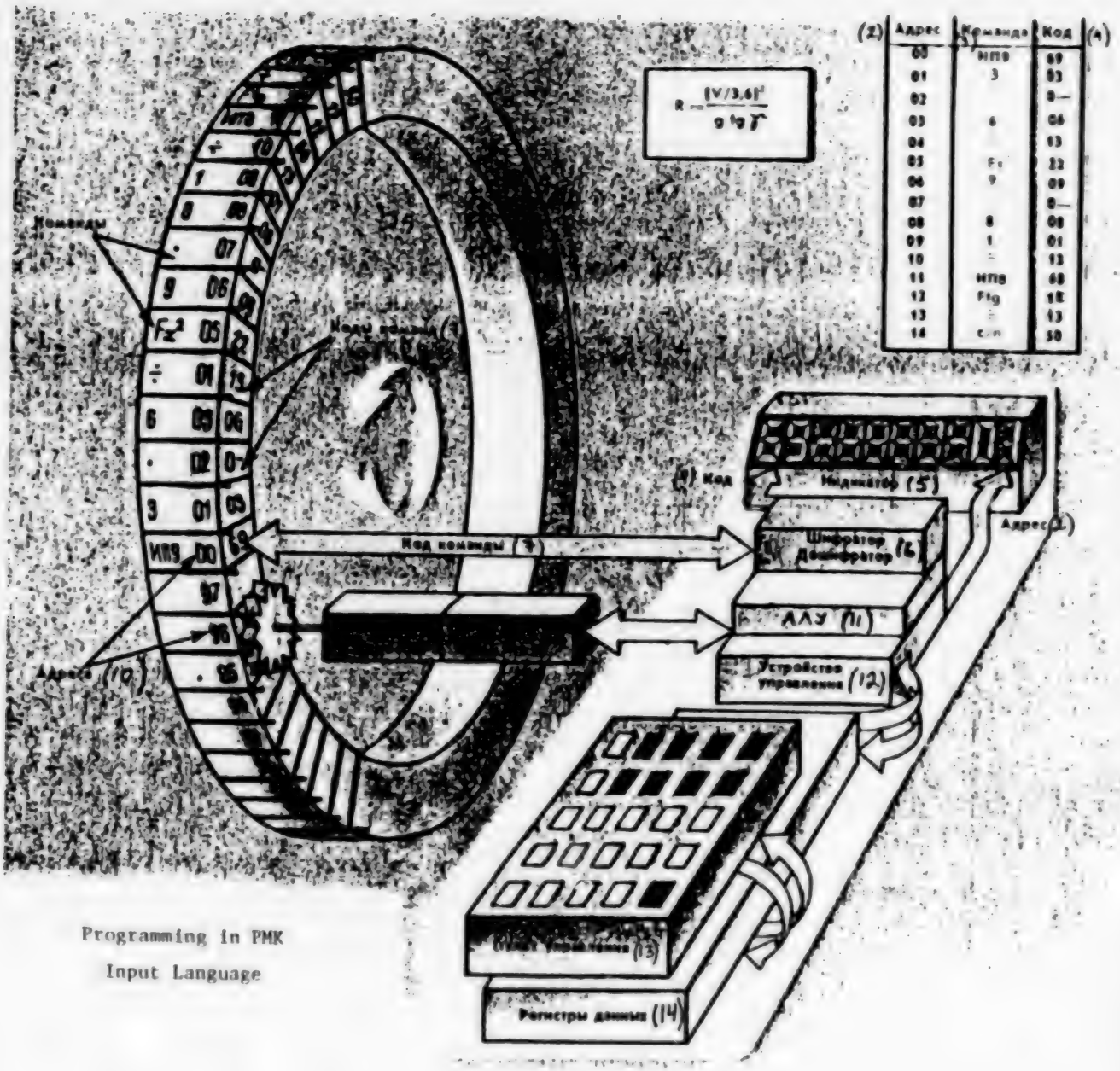
[Article, published under the heading "The Pilot and the Computer," by Cols A. Andreyev and V. Rubin: "Programming in Programmable Electronic Calculator Input Language"; final article of four-article series, see Nos 7, 8, 9]

[Text] As we know, programmable electronic calculators (PMK) enable one to perform automated problem solving on the basis of a program prepared in advance and entered into the microcalculator's memory. In the process of solving the problem, that instruction to be executed at a given stage is taken from the applications program RAM. It is then interpreted, and the procedure to be performed is determined from the information contained in the instruction.

PMK of Soviet manufacture use a simple symbolic-code programming language with a specific system of instructions. This means that during programming, instructions are entered into memory (PrP) by pressing symbol-marked keys, and appropriate codes are assigned to them in the form of numbers and signs represented on the PMK display (see figure on following page).

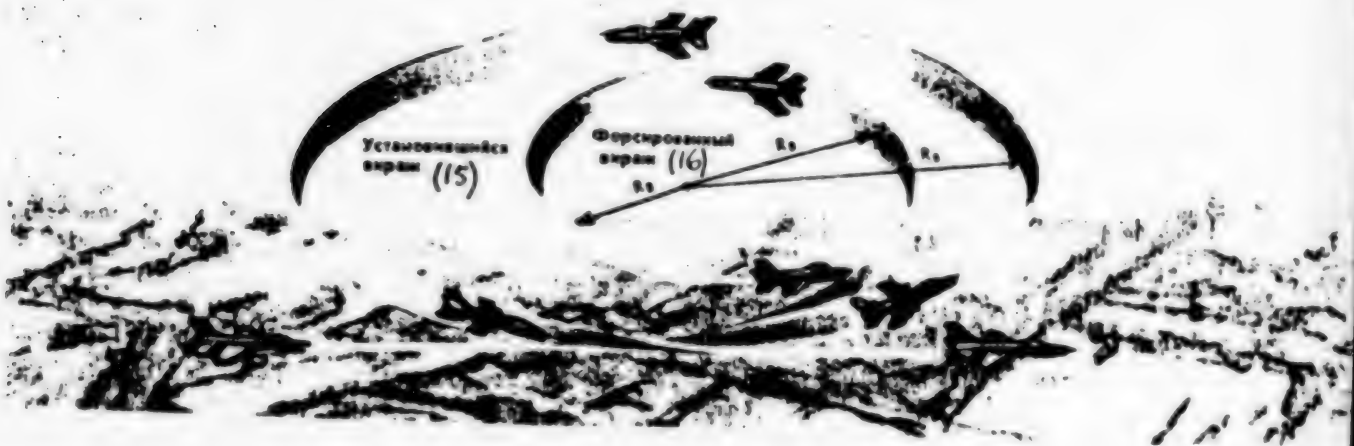
As a rule an instruction code is a two-digit number. But there are 100 two-digit numbers — from 00 to 99, and yet there are approximately 200 operations codes in a PMK. Therefore characters such as G, L, I, E are used in addition to digits in a two-character code. For example, the addition operator code is the number 10, and the symbol 1G is the Fcos operator code.

It was previously noted that a ring reminiscent of a Ferris wheel with enclosed cars can serve as a model of the PMK applications program RAM (see figure on following page). The address of the current "car" (memory location) is placed in the instructions counter. After a "passenger" has been placed in a "car" -- an instruction has been placed in RAM -- the address is automatically incremented by 1, and the "wheel" turns, readying the next "car" to take the next "passenger." The contents of the instructions counter can be changed either from the keypad or by program. The "wheel" can turn a specified number of positions in either direction.



Programming in PMK

Input Language



Key to figure on preceding page: 1. Program; 2. Address; 3. Command; 4. Code; 5. Display; 6. Coder-decoder; 7. Instruction code; 8. Address counter; 9. Register; 10. Addresses; 11. Arithmetic and Logic unit; 12. Control unit; 13. Keypad; 14. Memory registers; 15. 360 degree sustained turn; 16. 360 degree accelerated turn

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Since the maximum number of instructions is determined by the number of memory locations, program length (number of instructions) should not exceed memory capacity, that is, the number of memory locations in the MK-54, BZ-34, and MK-56 PMK, and they are numbered by two-digit numbers from 00 to 97. When all 98 memory locations are filled, an attempt to enter a new instruction will cause it to be placed at memory location with address 00, overwriting its contents. This also applies to the NK-61 programmable electronic calculator, which contains 105 program memory locations.

Instructions are written to program memory in programming mode by pressing the desired key, which causes the instruction codes to be written automatically. Therefore there is no need to memorize operation codes. For checking purposes, however, one can use the operation code table contained in the calculator's operating manual.

Thus a program is contained in the calculator in the form of a sequence of separate instructions, each of which occupies one, in some cases two program memory locations. The sequence can subsequently be repeated again and again in automatic program count.

Let us examine as an example the sequence of preparing and entering a program to calculate the radius of an aircraft 360 degree banked turn using the well-known formula Rt = (V/3.6)sq / G tg gamma. We shall assign the P9 and P8 registers to hold airspeed (V) and angle of bank (gamma) input data.

The program sequence in input language with inverse notation should be as follows: 1. Take V (km/h) from the P9 register. 2. Enter the number 3.6. 3. Divide V by 3.6. 4. Square the result of V/3.6. 5. Enter the number g= 9.81. 6. Divide (V/3.6)sq by 9.81. 7. Take gamma from the P8 register. 8. Determine tg-gamma. 9. Divide the result (V/3.6)sq/g by tg-gamma. 10. Stop program.

The following key entry sequence and program (Table 1, on following page) correspond to this sequence.

We shall enter the program into the PMK. For this, press keys F and PRG to switch to programming mode. The number 00 will appear in the right-hand part of the display. This signifies that access is open to RAM, the instructions counter has been set to zero, and the first instruction to be entered will be assigned to address 00. Entry of each new instruction will increment the contents of the instructions counter by 1, with the address shown in the right-hand corner of the display.

Let us press keys P->x, 9 (first operation). The number 69 appears in the left-hand corner of the display -- the operation code for reading V (km/h)

from memory. This signifies that the instruction has been written to memory, that is, the "passenger" with the code 69 has been placed in "car 00." At the same time the number has incremented in the instructions counter, with the number 01 appearing on the display. This address will be occupied by the next instruction -- "car 01" is ready for "boarding" (see figure above). The display shows: 69 01.

(1) Последовательность действий	(2) Нажимаемые клавиши	(3) Программа: (4) адрес	(5) команда	(6) код
1	П→X 9	00	ИП9	69
2	3	01	3	03
	.	02	.	0—
	6	03	6	06
3	÷	04	÷	13
4	F X²	05	Fx²	22
5	9	06	9	09
	.	07	.	0—
	8	08	8	08
	1	09	1	01
	÷	10	÷	13
7	П→X 8	11	ИП8	68
8	F lg	12	Flg	1E
9	÷	13	÷	13
10	С/П	14	С/П	50

Key: 1. Sequence of operations; 2. Keys pressed; 3. Program; 4. Address; 5. Instruction; 6. Code

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Second operation in entering the program. We press key 3. Code 69 shifts one position to the right, instruction code 03 appears in position 1, and the number 02 appears in the right-hand corner of the display. The next instruction, "." — a decimal point, will be placed at this address. Pressing key ".", we see that in the left-hand corner both codes, 03 and 69, have shifted simultaneously to the right, and the decimal point code, "0-", has appeared in position 1, that is, 0-, 03, 69, 03.

The three instruction codes and the address of the next instruction have filled up all display positions. Therefore entry of each new instruction will place its code in position 1 and displace preceding codes to the right, erasing the last one. As a result of the second operation the display reads: 06, 0-, 03, 04.

Thus the program is written in PMK memory as a sequence of operation codes, which corresponds to the boarding sequence of "passengers" with name-codes: 69, 03, 0-, 06, etc, in conformity with the code column in the program listed

in Table 1 on the preceding page. After execution of the instruction at address 13, which gives our final computation result, we must stop the program. To do this we enter the instruction S/P (stop-start) at program instruction address 14. Its code is 50 — "last passenger to board." The display shows: 50, 13, IE, 15.

We should note that the S/P key has two functions. One has already been mentioned: pressing it in programming mode stops the program. To acquaint ourselves with its other function, we must switch the PMK from programming to calculation mode. To do this, press keys F, AVT — the display shows 0. Now the PMK is ready to run the loaded program. But before starting the calculator in automatic mode, we must tell it what instruction to start the count with.

The beginning instruction of a program loaded into the PMK is located at address 00. We shall note that when the calculator was switched to calculation mode, that address which was the last address in F PRG mode remained in the instructions counter. In order to set the counter to zero, we must press the V/0 key ("zero set") key in F AVT mode, which causes the instructions counter to return to address 00. For the RAM model we are using, this corresponds to "running Ferris wheel car 00 to the position to board the first passenger" — operator with code 69 (read V from the P9 register). At present, however, there is no numerical information in the assigned memory registers P9 and P8 for storing V (km/h) and gamma.

As an illustration, we shall enter the number 850 in the P9 register and 60 in the P8 register (thus stating V=850 km/h and gamma=60 degrees). To do this, we press in sequence keys 8, 5, 0, X->P, 9 (entering 850 in the P9 register) and 6, 0, X->P, 8 (entering 60 in the P8 register). We shall note that since bank is specified in degrees, we must set switch R = GRD = G in the G position.

Now the PMK is ready to run the program. We start it in automatic program run by pressing the S/P key — this is its second function. After approximately 3 seconds the result will appear in the display: 3280.9771, that is Rt=3281 m.

We can trace the calculation process by following the program step by step. To accomplish this we press the V/0 key, again setting the PMK to address 00. Now we shall sequentially press the PP key ("stepping" through the program). First step: the number 850 appears in the display — "passenger with code 69 has left car 00," which corresponds to transferring the number 850 from the P9 register to stack register X. Step 4: the number 3.6 appears in the display: "passengers with codes 03, 0-, and 06 have disembarked from cars 01, 02, and 03, producing the number 3.6." This number was stored in the X register, while the number 850 was transferred to the Y register. Step 5: "Passenger with code 13 has disembarked from car 04." Since code 13 indicates a two-number division operation on the operand stored in the Y register by the operand in the X register, the result 850/3.6 = 236.11111 will appear on the display. Step six: the number 55748.456 appears on the display — the result of a one-number operation of squaring the number 236.11111 — "passenger with code 22 disembarks," etc.

To calculate the turn radius with new airspeed and bank angle values, these flight parameters must be loaded into the P9 and P8 registers, followed by pressing the V/0 and S/P keys. For example, V=200 km/h, gamma=45 degrees (the banked turn is being flown by a helicopter), the display reads: 314.61974, that is, Rt=315 m.

The above examples show that programming should be preceded by a minimum of two preparatory stages. The first stage involves mathematical formulation of the problem, that is, its condition is described either in the form of equations or a formula, or a sequence of several formulas required for solution. At the second stage one creates the algorithm which defines the sequence of operations (instructions) and leads to solution of the problem. In other words, in preparing an algorithm one determines the sequence of steps which unambiguously define the processing of input and intermediate data into a solution result. The program proper comprises a translation of algorithm into a programming language.

A description of the algorithm by word and formula was used to solve the problem, but a schematic representation provides more clarity. Corresponding to each type of operation (entry of input data, computation, testing conditions, control of cyclic calculation process, result output, end program) is a geometric figure specified by GOST (19002-80 and 19003-80) -- an operation symbol. Symbols are connected by lines indicating operation sequence.

The program text is in the form of a table, in which one enters addresses, instructions, and codes. A program should end with instructions to the user. These instructions state, point by point, clearly and concisely, the procedures to follow, from entering the program text, input data and constants, to obtaining a final result. The user instructions are followed by an example — a program text as well as running time. Accompanying remarks may include program peculiarities and references to use of instruction sequences developed by other programmers.

We shall illustrate the above with an example of creating a program to determine the effect of operational factors: aircraft weight (G), ambient temperature (T) and barometric pressure (P) — on an aircraft's airspeed at touchdown.

As we know, airspeed at touchdown is determined with the formula

$$V_{\text{—}} = \sqrt{\frac{2G}{C_{y\text{—}}\rho S}}.$$

Using gas (air) state equation P / rho =RT and applying the method of differential corrections, we obtain:

$$\frac{\delta V_{\text{—}}}{V_{\text{—}}} = \frac{1}{2}\left(\frac{\delta G}{G} + \frac{\delta T}{T} - \frac{\delta P}{P}\right)$$

As a result:

$$\delta V_{пр} = V_{пр} \cdot \frac{1}{2}\left(\frac{G - G_{ст}}{G} + \frac{T - T_{ст}}{T} - \right.$$

$$\left. - \frac{P - P_{ст}}{P}\right),$$

$$V_{пр} = V_{пр.ст} + \delta V_{пр}$$

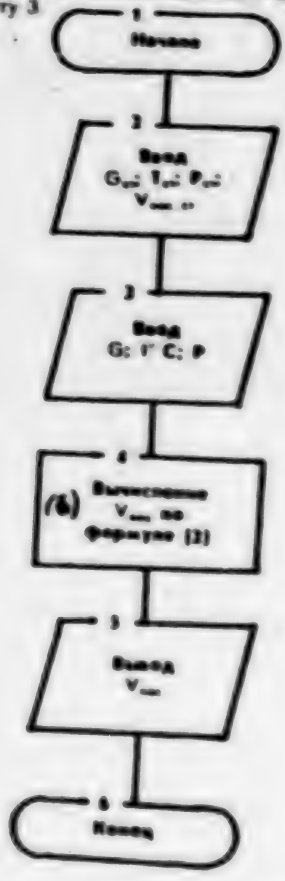
where ct indicates standard values of parameters (Gct — standard landing weight, Tct=288 degrees K, Pct=760 mm Hg), with G, T, and P current values for aircraft weight, temperature K and barometric pressure at the destination field.

The following figure contains a diagram of the problem solution algorithm. The oval figures indicate program start and end, a parallelogram indicates data entry or output, and a description of the computation operations is contained in the rectangle.

Table 2 lists a program to calculate Vt when G, t degrees C, P differ from standard values (see following page).

Инструкция: 1

1. F 1019, ввести программу. F АВТ. В/0.
2. Ввести $G_{т}$, в рг. 11А; $T_{т}$ = 288 в рг. 11В; $P_{т}$ = 760 в рг. 11С; $V_{пр}$ = в рг. 11Е.
3. Ввести G в рг. 11Н; t° С в рг. 11В; $P_{пр}$ = в рг. 117.
4. С/П, результат в рг. X.
5. Для новых значений G, t° С, P перейти к пункту 3.



Key:

1. Enter program; 2. Enter; 3. Result; 4. For new values; 5. Proceed to; 6. Calculation using formula; 7. Illustration; 8. Displayed; 9. Address; 10. Instruction; 11. Code

7 Контрольные результаты: $V_{пр}$ = 280 км/ч; $G_{т}$ = 12500 кг; при G = 14500 кг; t = +15° С, P = 760 мм рт. ст.;

8 на индикаторе 300 74072: $V_{пр}$ = 301 км/ч; при G = 12500 кг; t = +40° С, P = 760 мм рт. ст.;

на индикаторе 291 64724: $V_{пр}$ = 292 км/ч; при G = 13700 кг; t = +27° С, P = 748 мм рт. ст.;

на индикаторе 301 66463: $V_{пр}$ = 302 км/ч.

Время счета ~ 10 с.

9 10 11

Адрес	Команда	Код	Адрес	Команда	Код	Адрес	Команда	Код
00	П19	69	12	П1В	6L	24	+	10
01	П1А	6–	13	–	11	25	П1О	60
02		11	14	П1Д	6Г	26	+	10
03	П19	69	15	÷	13	27	2	02
04	÷	13	16	П1	41	28	÷	13
05	ПО	40	17	П17	67	29	1	01
06	П1В	6В	18	П1С	6[	30	←	14
07	2	02	19		11	31	–	11
08	7	07	20	П17	67	32	1/х	23
09	3	03	21	÷	13	33	П1Б	66
10	+	10	22	/ – /	0L	34	X	12
11	ПД	4Г	23	П11	61	35	С/П	50
						36	БП	51
						37	00	00

Table 2.

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WESTERN DEVELOPMENTS IN REMOTELY PILOTED VEHICLES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 34-35

[Article, published under the heading "Weapons of Aggression and Brigandage," by Col A. Terenichev and Lt Col G. Orekhov: "Remote-Piloted Offensive Weapons"]

[Text] The United States and its NATO allies are stubbornly continuing to pursue a policy aimed at gaining military superiority over the USSR and the other countries of the socialist community, spending vast sums on the development of new weapons. Bespilotnyye letatelnyye apparaty (BLA) [lit. "pilotless aircraft"] and, in particular, distantsionno pilotiruyemyye letatelnyye apparaty (DPLA) [remotely piloted vehicles, RPVs]. These are assigned an important role in the capitalist countries' military preparations. This is connected first and foremost with enhancing the effectiveness of air defense assets.

Originally drones were employed solely as air targets and were derived from piloted aircraft. Subsequently, with advances in aircraft control technology, new types of drones began to appear, specially designed to perform more complex missions of a military nature.

RPVs were first tested in combat in the aggressive war waged by U.S. imperialism in Vietnam. The Ryan 147A and VOUGHT-34A photoreconnaissance drones were used in Vietnam, for example. In 1973 Israel employed U.S.-built Ryan-147 RPVs in its aggressive operations against Arab countries. In Tel Aviv they are of the opinion that RPVs were used with greatest success as decoy targets launched just prior to raids by manned aircraft. This helped confuse air defenses and helped accomplish relatively successful air defense penetration.

RPVs designed and built in Israel were extensively used during the bandit raids on Lebanon in the summer of 1982. For example, even prior to initiation of the aggression a Scout RPV flew preliminary reconnaissance over the area of forthcoming military operations. After the attack on Lebanon commenced, Israeli military authorities regularly obtained real-time intelligence on the ground situation with RPVs. This made it possible to coordinate attacks by Israeli air and ground forces. A target-designator version was used to

illuminate targets with laser beam in conjunction with laser-guided bombs and missiles, and RPVs carrying EW gear were used to jam radar in Lebanon.

Today various types of RPVs are in the operational inventory of almost all developed capitalist countries. A large number are also in the development and testing stages. The majority of RPVs of the member countries of the aggressive NATO bloc are designed to conduct aerial reconnaissance with camera, TV, radiation, infrared, laser, and radar gear. In addition, many of these vehicles can be quickly modified to function as target designators. As is attested by the foreign press, an important role in the military preparations of the NATO countries is assigned to RPVs designed for electronic warfare and for experimental purposes. The idea of developing experimental RPVs is connected with the task of cutting expenditures and diminishing the degree of risk in development of new promising and very expensive aircraft, since using small and relatively inexpensive models provides capability to test the validity of engineering designs for experimental aircraft.

The size of RPVs can vary from that of a modern aircraft to a model aircraft with a wingspan of about 2 meters, depending on function and assigned missions. At the present time, judging from reports in the foreign press, there is a trend toward development of multipurpose mini-RPVs weighing not more than 100-250 kg. The principal advantages of these vehicles include enhanced mobility due to small size and weight, a higher degree of combat readiness, and a small radar signature.

RPVs are subdivided on the basis of design into airplane-type winged vehicles, rotary-wing (helicopter), and gas-bag (mini-dirigibles). Principal methods of launching RPVs: by launcher with a solid-propellant booster, compressed-air or hydraulic catapult, launched from a mother aircraft, or wheeled-gear takeoff. RPVs are retrieved by parachute, net, or land like airplanes.

Continuous, uninterrupted control of airborne RPVs is a most important condition for ensuring successful mission accomplishment. RPVs can be radio-controlled, program-controlled, or combined-control.

The communications link is the weakest point in the RPV system. The fact is that in flight it is necessary to maintain highly-reliable wideband communications both at short and maximum ranges. Raising the operating frequency improves the jamming resistance of radio-command communications. But since high-frequency communications are possible only within line-of-sight, sometimes additional control transmitters or relay transmitters are used. All this complicates communications and mission accomplishment.

Remotely piloted vehicles possess a number of advantages over piloted aircraft: for example, more economical operation, due to the lower cost of training ground control operators in comparison with the cost of training pilots. Less is also spent on logistic support of RPVs. Flying RPVs is more comfortable, since the ground operator, in contrast to a pilot, is not subjected to vibrations, noise and G loads, and his life is not threatened by immediate danger. The absence of limiting factors connected with the presence of a pilot on board makes it possible to broaden the range of missions performed by an RPV.

According to the results of research conducted by a British company, all these advantages are virtually lost when using expendable RPVs designed for strike operations. In spite of this fact, however, according to reports in the press, employment of RPVs in such operations is presently expanding. In particular, in recent years the U.S. Department of Defense, with the support of leading aerospace companies and laboratories of all branches of service, has concentrated its attention on research connected with the search for possibilities of utilizing mini-RPV strike vehicles, as well as on testing of air- and sea-launched mini-RPVs.

According to the U.S. Air Force's program to establish rapid-reaction forces, performing police functions in various parts of the world, the foreign press reports that the Pave Tiger system is scheduled for deployment in the latter half of the 1980's. This system includes a small, expendable antiradiation RPV designed to knock electronic facilities out of operation, including Warsaw Pact air defense radars and command posts, which in the opinion of foreign military experts present a serious threat to U.S. Air Force Tactical Air Command operations. A thousand of these vehicles are to be purchased and deployed in the countries of Western Europe. The U.S. Department of Defense views this program as a key element of its aggressive plans in implementing a new concept of sealing off the battlefield and impeding the advance of second-echelon forces of the Warsaw Pact countries to attack position.

The Pave Tiger RPV is a canard-wing design with an oval fuselage 2.1 meters in length. Vertical fins with rudders are placed at the ends of the forward-folding swept wings with a span of 2.6 m. The vehicle has a maximum weight of 127 kg, flies at a speed of 185 km/h, at an altitude of 2,500-3,600 m, with an endurance of 8-10 hours. The standard Pave Tiger combat system will also include a standard transport/launch container accommodating 15 vehicles, a launch device, and a power source. It is believed that in combat conditions a two-man crew will be able to launch daily a large number of vehicles.

Since 1980 the United States has been working on modifying the R4E series of "Eye in the Sky" RPVs. Participation in strike operations is considered to be one of the principal applications of the R4E-30 vehicle. The Dragonfly rotary-wing mini-RPV, which was demonstrated at the beginning of October 1984, is designed to destroy certain kinds of targets. Since the beginning of the 1980's the United States has been working on several classified RPV projects, very meager information on which has made its way into the foreign press.

Great Britain, the FRG, France, Italy, Belgium, Canada, Israel, and other capitalist countries are also taking part in the development of small military-applications remotely piloted vehicles. Both national and joint projects (USA-FRG, FRG-France-Canada, FRG-France) are in progress. It is believed that the new-generation RPVs will begin entering the operational inventory in the latter half of the 1980's, while by the end of the 1990's the RPV fleet of the countries of the aggressive NATO bloc will consist solely of new-generation vehicles.

At the present stage, due to financial considerations and considerations of flight safety, deployment of small RPVs is specified, at least in the European

capitalist countries. These vehicles, according to information in the foreign press, are to be used to support combat operations by manned aircraft within effective range of hostile air defense assets, and as EW reconnaissance vehicles, as weapons to attack hardened point targets, for target illumination, observation of fire, communications relay, and delivery of chemical and bacteriological weapons.

The principal means of launch-readying and launching reconnaissance drones (BSR) is a mobile self-propelled launcher which, with the aid of a night vision system and equipment for determining vehicle position coordinates, can travel undetected during hours of darkness and proceed to a designated launch point. To shorten the time needed to ready the drone at the launch point, preliminary readying procedures can be performed in a servicing or staging area.

A programmed autopilot controls execution of the mission. The drone can maneuver en route both vertically and horizontally. Low-level flight capability as well as a small radar cross section greatly diminish its vulnerability to air defense fire. Intelligence gathered by such reconnaissance drones can either be stored on board or real-time transmitted to a ground receiving station, which is extremely important in conditions of a rapidly-changing tactical situation. The vehicle is recovered with the aid of a parachute and soft-landing motor. In the development of promising tactical reconnaissance drones, the greatest attention is being devoted to assuring optimal cost, which is achieved by simplifying construction and operating methods, by increasing the efficiency of intelligence-collecting gear, and by incorporating combined jamming-resistant control systems (radio-command and computer-program).

We have discussed the basic development prospects for remotely piloted vehicles, weapons of brigandage and aggression, which offer additional confirmation of the hypocrisy and lies of the U.S. Administration, which talks about peace but in fact is pushing the world to the brink of war.

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"SINISTER" PURPOSES OF U.S. FOREIGN ARMS SALES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 86 (signed to press 2 Sep 86) pp 42-43

[Article, published under the heading "Imperialism — Enemy of Peoples," by Candidate of Economic Sciences Lt Col N. Karasev: "Under the Guise of Philanthropy"]

> [Text] One can state without exaggeration that the system of imperialism continues to live to a substantial degree by robbing, looting, and ruthlessly exploiting the developing countries.... Developing countries are exploited by all imperialist states, but U.S. imperialism is without question doing this in the most high-handed manner.
>
> From the Proceedings of the 27th CPSU Congress

The interventionist concept of "neoglobalism" advanced by the U.S. Administration as a weapon in its arsenal calls for the aggressive arming of reactionary pro-American regimes in the countries of Asia, Africa, and Latin America. In official U.S. circles the sale of arms and combat equipment to developing countries has long been called an "act of philanthropy," a matter of supporting one's friends and lending them assistance at a difficult moment.

In recent years, however, the hypocrisy of such claims has been increasingly more thoroughly and fundamentally exposed, even in the Western literature. The arms trade is one of the most important instruments of the reactionary imperialist policy of "neoglobalism" toward the developing countries. It is assigned a significant role in U.S. efforts to hold these countries within the U.S. sphere of influence and to shackle them more securely to the chariot of the arms race. By means of military exports Washington seeks to place stepped-up pressure on the policies of the importing countries, to guide policy into a channel favorable to the United States, and to utilize it in the struggle against the world socialist community and the national liberation movement.

Export of arms is a widely used method of imperialist robbery of developing countries. The sale of weapons and combat equipment to young nations has today become a powerful "pump" with which to suck money from former colonies.

This situation is dictated primarily by the fact that in the world capitalist economy the imperialist countries, and the United States in particular, possess an absolute monopoly on the manufacture and marketing of modern arms. This serves as a factor of monopoly pricing on the world capitalist arms market.

The products turned out by the militarized branches of an imperialist economic system frequently have no world price counterparts. Acting in the interests of domestic military-industrial firms, the U.S. Government uses its political weight for the purpose of setting prices on export consignments of arms and combat equipment at an extremely excessive level. As an example of this price-setting practice one can cite the U.S. deal involving sale abroad of AWACS aircraft. As reported in the foreign press, the United States set a price of 175.7 million dollars per copy on the external capitalist market, while aircraft of the same category, stuffed with much more modern electronic equipment, were being sold to the Pentagon at a price of 95.8 million dollars. As a result the United States is able substantially to improve its foreign trade balance at the cost of its "partners'" funds.

To a decisive degree it is precisely for this reason that in recent decades the United States has substantially altered the character of financial support of its foreign trade in arms. In the 1950's and 1960's military hardware and equipment were provided by the United States to former colonies for the most part as "outright grants." The U.S. Government would purchase the required arms from domestic military-industrial monopolies and send them to a given country on the basis of military assistance programs.

The situation changed radically in the 1970's. The United States established a procedure whereby the importing countries began acquiring U.S. combat equipment for the most part on a commercial basis, that is, paying cash or purchasing on credit. According to reports in the foreign press, between 1950 and 1974 the United States shipped abroad in the form of "grants" arms totaling in excess of 22 billion dollars in constant prices, as well as 11 billion dollars worth of arms in the form of foreign military sales. Between 1975 and 1985 more than 110 billion dollars worth of U.S. arms were exported in the form of foreign military sales, and 2 billion dollars worth in the form of "grants." U.S. scholars note that in recent years sales have almost totally replaced "grants."

Today the source of payment for U.S. exports has changed radically. In the past exports were paid for primarily with money collected from American taxpayers, while today payment is made with funds coming directly from the importing countries.

This situation has considerably heightened interest on the part of private U.S. military-industrial firms in foreign arms sales. In the period 1950-1973 commercial export of military hardware permitted by the law on export controls totaled 1.2 billion dollars, while the figure exceeded 20 billion dollars in the period 1974-1985. In the estimate of U.S. specialists, however, these official figures are understated by at least a full order of magnitude.

The Stockholm Institute for the Study of World Problems claims that large-scale commercial military trade imposed by the United States has become one of the main reasons for the enormous foreign debt of a large number of developing countries. The mechanism is simple. These countries' ongoing balance of payments deficit, resulting from one-way purchass of U.S. military hardware, is covered perforce by U.S. loans and credit. As a result expanding U.S. military production is being financed, in addition to other sources, by a growing burden of shackling debt on the majority of countries in Asia, Africa, and Latin America. The 27th CPSU Congress pointed precisely to this fact, noting that there is definitely a causal linkage between the trillion-dollar debt of the developing countries and the more than 1 trillion dollar growth in U.S. military expenditures over the last decade.

There are sufficient grounds to maintain that the United States is seeking by means of military sales to shift as much as possible the economic burden of exhausting militarist preparations onto the shoulders of the peoples of liberated countries. The expanded volume of military trade with young nations is being exploited by the United States to increase the size of arms production runs, to hold back increase in expenditures on arms manufacture, to maintain the mobilization readiness of military industry, to maintain this industry's reserve production capacity, and to keep skilled personnel in the militarized sector of the economy. According to the figures of U.S. scholars, increase in the manufacture of modern combat aircraft as a result of sales to developing countries is enabling the U.S. military- industrial corporations to reduce by 300,000 dollars production costs on a number of aircraft currently in production. On the whole the sale of 6.5 billion dollars worth of weapons to Asian, African, and Latin American countries makes it possible to save up to 450 million dollars annually by reducing the cost of manufacturing military goods.

The Stockholm Institute for the Study of World Problems reports that at the beginning of the 1980's U.S. entrepreneurs utilized, directly and indirectly, 800,000 persons for the manufacture of arms for export to developing countries, thus supporting the U.S. military economy to a considerable degree with the financial resources of many former colonies. A sharp increase in the percentage share of sale of basic types of armaments in U.S. foreign military trade is connected precisely with this fact.

Aircraft, missiles, warships and tanks have today become the principal items of U.S. foreign military sales. Today they represent far greater than 90 percent of total U.S. export of military goods. This is no mere happenstance. This policy is organically linked to the global military-political and military-economic preparations by U.S. imperialism. Expanding markets for the sale of basic weapons systems fosters globalization of the sphere of activity of the U.S. military-industrial complex and leads to the creation of a military-political and military-economic structure which is in conformity with long-term strategic goals in the struggle against the USSR and the entire socialist community and against national liberation movements in various parts of the world.

In addition, acquisition of modern weapons by countries with a relatively low level of technological and economic development inevitably leads to the

formation of a complex military infrastructure on their soil: airfields, missile launchers, communications systems, maintenance depots and other facilities. As a result a special domain of the economy the functioning of which is entirely subordinate to the U.S. military-industrial complex is also forming and expanding in a goodly number of developing countries. U.S. calculations of gaining military-economic benefit from the sale of arms to young nations even consider the difference in the cost of maintaining U.S. military personnel and military forces in comparison with maintaining military forces of U.S. satellites which are former colonies. It is reported in the foreign press that it is much cheaper to arm U.S.-ally developing countries and to supply them with military goods for the benefit of Washington than to maintain U.S. military forces abroad.

In the last decade the United States has extensively used military trade as a weapon in the struggle for the strategic raw materials of developing countries. In particular, the Reagan Administration uses this channel for penetrating to sources of liquid fuel. In the first half of the 1980's, for example, the United States stated as one of its motives for selling a large consignment of F-16 aircraft to Venezuela the endeavor to guarantee dependable supply of Venezuelan crude for the U.S. economy.

Thus in utilizing the fact of economic and technological dependence and the unequal position of the developing countries in the world capitalist economy, imperialism ruthlessly exploits them, exacting billions in tribute, is exhausting the economies of these countries and is attempting to pull them into the militarist orbit and to use them as a springboard in its aggressive global strategy.

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SPACE SHUTTLE VERSUS ARIANE BOOSTER IN SATELLITE-LAUNCH ROLE

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[Text] In April of last year, as the space shuttle Discovery was landing at the Kennedy Space Center, another landing-gear failure occurred, causing the shuttle craft to veer from the runway center line. Concerned astronauts, led by G. Hartsfield (who, incidentally, had never landed at this facility), raised the issue that landing at Cape Canaveral was dangerous and could some day end in tragedy.

After that, space shuttle craft landed only at Edwards Air Force Base. NASA officials, however, once again decided to use Cape Canaveral for the 24th shuttle mission (for considerable money had been spent on building the runway at the Kennedy Space Center). Only after U.S. astronaut J. Young, a veteran of six manned space missions, made a special inspection flight of the landing area and concluded that it was dangerous was the landing transferred to Edwards Air Force Base.

This took place on 18 January of this year. Ten days later the world witnessed the tragic launch of the Challenger. This time they were unable to prevent the tragedy. The U.S. astronauts could have survived if the shuttle design had incorporated a launch emergency ejection system. Only during the first shuttle test flights were the astronauts provided with emergency ejection seats. These were eliminated by the first operational shuttle mission.

A thorough examination of the program following the tragedy at Cape Canaveral also addressed other problems with the shuttle, in particular the fact that it is inefficient as a means of launching satellites, especially those requiring a geostationary orbit. A satellite in a geostationary orbit hangs suspended, as it were, above a specific point on the equator, which is of considerable importance for performing a number of applied tasks (in the area of satellite communications, navigation, meteorology, etc). Special orbital transfer vehicles were to be used to place satellites into a geostationary orbit, but

NASA proceeded with their development on a last-priority basis, and as a result their development was still uncompleted by the first operational shuttle missions.

It is interesting to note that in July 1971, even prior to the beginning of work on the shuttle project, the Federation of American Scientists issued a public statement that the space shuttle would be of doubtful economic benefit if serious attention was not focused on developing a sufficiently effective orbital transfer vehicle to boost a payload from a shuttle orbit into a higher orbit. NASA ignored this advice and soon rejected the reusable orbital transfer vehicle specified in the original plan, replacing it with the "temporary" expendable IUS vehicle. Subsequently a modified Delta booster upper stage was used (the PAM-D vehicle).

We should note that accuracy in positioning a geostationary satellite with the orbital transfer vehicle is less than that accomplished by orbit injection with an expendable booster. This is the reason for successful competition with the space shuttle by the Ariane booster even in its initial version. The fact is that more accurate placement of a satellite into its calculated orbit also means a longer operational life, and if income from extending a satellite's life covers the difference in the cost of launch, using the Ariane booster becoms more advantageous.

The West European Ariane booster was developed primarily to launch satellites into geostationary orbit, since this was required by the applied space program proposed at the end of the 1960's for joint operation by a number of West European countries. At the beginning of the 1970's, when the fate of the Ariane was not yet settled, nobody had any inkling that the Ariane booster, developed primarily for this program, ultimately would not only enable Western Europe to become independent of the United States in the area of space but would also serve as a substantial trump card in their subsequent relations in this area.

These relations were always complicated and unequal. The United States, which possessed boosters sufficiently powerful to launch applications satellites, had no desire to share the "fruits" of the space program with anybody else and cast a jealous eye toward the decision of the West European countries to establish an applied space program and to develop their own booster for that program. Their fears were set at rest by the fact that the West European countries spent 10 years attempting to develop a less powerful booster and failed.

Things could be different this time. The United States took "extreme" measures, proposing to the West European countries that they participate in the shuttle program, reasonably concluding that, due to a lack of funds, the West European countries would be forced to choose between developing their own rocket and participation in the shuttle project. Various emissaries were dispatched to Western Europe, including W. von Braun himself, who proposed that they abandon development of an "old-model" rocket and work with the most up-to-date technology by taking part in the shuttle program. The West European countries were initially put in charge of development of an orbital transfer vehicle in which, as already stated, NASA was not very interested.

Subsequently this was opposed by U.S. military officials, since such a contract required that the West European countries become acquainted with modern rocket technology. For this reason a new proposal was made to Western Europe — development of a manned module in which (as an element of the space shuttle) astronauts could conduct scientific investigations. It was pointed out that development of such a module was an important intermediate stage before developing a permanent orbital station (apparently by this time NASA had become disenchanted with this project as well). While the orbital-transfer vehicle contract introduced a certain split in consolidation of the countries of Western Europe, however, the change in contract once again united them, and not in the direction the United States was expecting.

Western Europe's big three — Great Britain, France, and the FRG — responded differently to the U.S. proposals. Great Britain was quite willing to abandon the West European rocket and proceed with development of an orbital transfer vehicle. Having invested considerable money in this project, it was quite unhappy over cancellation of this contract. Now Great Britain no longer opposed development of a West European booster, although it did not go so far as to take part in the project. The FRG, which was more committed than the others to the Spacelab manned module project, was also not averse to participation in development of the West European booster, if the project did not prove to be too expensive. At this point France proposed a version of the Ariane booster which in fact was an upgraded (although not very) model of a French booster, and agreed to contribute the bulk of development funding.

A program calling for parallel development of the Spacelab module and the Ariane booster was given final approval at a meeting of representatives of the West European countries on 31 July 1973. An alternative more to the liking of the United States did not come to pass, and that country was forced to accept the inevitable. In addition, the United States was pleased that Western Europe supported the idea of development of the Spacelab module. The fact is that increased inflation on the one hand and a sharp decline in interest by the U.S. public in space projects on the other led to a decrease in NASA budget appropriations (its budget had dropped to the 1961 level). In these conditions NASA was having difficulty with development of Spacelab with its own resources, and the importance of this module increased following cancellation of the proposed orbital station.

Inflation affected Western Europe to an even greater degree, reaching 27 percent in some countries (it was holding at 9 percent in the United States). In order to keep inflation from affecting development of the Ariane booster, it was decided to speed up this project, spending more funds in the first years. The NASA decision to subsidize the space shuttle project in the inverse manner (less money allocated at the first stage of development) led to a considerable increase in the cost of the project and was one of the reasons for the project falling behind schedule. As a result it was determined by the end of the 1970's that the West European Ariane booster might not only ensure the independence of Western Europe from the United States in space but might also win a certain percentage of satellite-launching business for other countries.

Thus a relatively inexpensive and quite promising booster, the Ariane, which possessed a number of advantages over U.S. boosters, had appeared on the world market. Delay in making the space shuttle operational and capability of more accurate placement of a satellite into geostationary orbit determined its success in competition with the space shuttle at the first stage of the space race. This success could hardly have continued, however, if it were not for the phased program to improve the Ariane booster, formulated back in June 1973. At that time a special team was set up to study development of the U.S. Delta rocket, utilization of the space shuttle to launch satellites, and possibilities for future evolution of the Ariane project.

At that time the West European countries were just beginning to feel apprehensive about competition by the U.S. Delta booster if a much improved version were to appear in the future. NASA, however, which had full confidence in the success of the shuttle project, put all work in this area on hold with the exception of improving the upper stages of existing U.S. boosters (orbital transfer vehicles for the shuttle were subsequently developed, based on these stages). In addition, the shuttle project required an increase in the number of missions flown each year, and in this case production of versions of expendable boosters was to cease in time (and therefore there was no need to improve them).

The upshot of this was that the Ariane 2 and Ariane 3 appeared in 1984-1985, considerably superior in efficiency to U.S. boosters. The problem of developing reliable orbital transfer vehicles had become quite evident by this time, in connection with which the Ariane 3 booster began to be thought of as highly in the world market as the space shuttle. The United States was holding an important trump card, however -- the opportunity for a representative of the client country to fly with the shuttle.

This was a clever move, and it had some success. It is true that some countries which happened to prefer the Ariane 3 made a compromise decision: they agreed to launch some of their satellites (or even just one) with the space shuttle (and this entitles them to send their own astronaut along), but to use the Ariane 3 to launch their other satellites. Naturally this did not apply to the majority of West European countries, which pursuant to the existing agreement were pledged to launch their satellites with the Ariane (Great Britain was an exception).

It is interesting to note that a similar NASA policy applied to a number of U.S. companies, and now McDonnell-Douglas and Rockwell have their own astronauts. After some time shuttle missions turned into a kind of publicity stunt involving even the participation of highly-placed officials. In particular, the chairmen of the Senate Subcommittee on Space and the counterpart subcommittee in the House of Representatives have flown on board the shuttle. Finally the tragedy at Cape Canaveral, with a representative of Hughes Aircraft and a schoolteacher among the victims, showed how dangerous this idea really was.

Little more than a month after the tragedy at Cape Canaveral, a U.S. Titan-34D rocket blew up during a satellite launch, and soon thereafter a Delta booster followed suit. This latter failure, as already noted, was due in some measure

to the shuttle project, which had absorbed funding which could have been spent on upgrading and improving the reliability of U.S. boosters (the Pentagon plans to continue using the Titan-34D). Since shuttle flights have been put on hold till the first quarter of 1988, all these booster setbacks are having a highly adverse effect on the entire U.S. space program as a whole.

On the other hand it seemed that the Ariane project would have suffered a considerable setback when, in September of last year, an Ariane 3 rocket blew up in front of French President Mitterand, who was attending the launch, but the program is once again gaining momentum. A new launch complex at the Kourou launch facility was operationally tested when an Ariane 3 rocket was launched in March of this year, and now the facility's capability to launch these rockets has increased by a factor of 2.5. And even another launch failure which ensued did not long delay development of the European Space Agency's plans. The first launch of the Ariane 4 booster is scheduled for the beginning of next year, representing another step forward in progression of the Ariane project.

A regular meeting of representatives of the West European countries was held at the end of January last year, a meeting which in significance of adopted decisions is sometimes compared with the meeting held in July 1973. The fact is that a decision was made on 31 January 1985 to approve a long-term space program focused on gaining complete independence by Western Europe from the United States in all areas of space exploration. In particular, this program calls for development of the Columbus permanent space station and the Ariane 5 booster, capable of launching into orbit the future West European Hermes space shuttle.

The birth of the West European space station project is due in large measure to the fact that, having contracted out development of the Spacelab module to the West European countries, the United States caused initiation of work in this area in the West European countries as well. Since the United States had not been working on such projects over the last decade, parity between the United States and Western Europe has begun to appear in this area as well. In particular, it is indicated by development of an independent West European modular space station, the Columbus, as well as by work on development of a West European space shuttle.

Several versions of such a space shuttle presently exist on paper, but more specific work is being carried out on the Hermes, subsidized by the French Government. Hermes is generally reminiscent of the U.S. space shuttle, but it is appreciably smaller in size (for which reason it is sometimes called a mini-shuttle). In addition, it is virtually a reusable stage of the Ariane 5 booster. According to statements made by some West European experts, it is economically more advantageous to use such vehicles, and it is only the enormous cost of development of a large space shuttle which prevents NASA from shifting to the construction and utilization of its own mini-shuttles to the detriment of the full-size space shuttle project.

The United States also has a more substantial reason, however, not to abandon its full-size space shuttle, involving the Pentagon's plans pertaining to the notorious "Star Wars" program. Nine flights are scheduled for the first year

of resumed shuttle flights, 14 in the second year, and 18 in the third. According to estimates by the Congressional Budget Office, approximately 75 percent of payloads will be of "vital importance for national security." In connection with this, observers note a change in the character of the space shuttle program. While at first the space shuttle was figured for commercial operation, it is today becoming transformed into a means of delivering military payloads which do not recover launch costs.

But let those persons who seek to intimidate our people not be deceived. We have a great deal of experience in this regard, and we know with whom we are dealing. "If it becomes necessary," said CPSU Central Committee General Secretary Comrade M. S. Gorbachev in an official statement dated 18 August 1986, "we shall quickly find a response, and it will be different from that expected by the United States. But it will be a response which will make the 'Star Wars' program valueless. I say this for one purpose: let the U.S. Administration reconsider the actual value of new military programs and the arms race as a whole from the standpoint of U.S. interests and U.S. security."

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